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A GEOGRAPHIC ANALYSIS OF LAND USE
IN EDMONTON'S RURAL-URBAN FRINGE ZONE

by



LENA MARGARETA HASSBRING

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
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FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled A Geographic Analysis of Land Use in Edmonton's Rural-Urban Fringe Zone, submitted by Lena Margareta Hassbring in partial fulfilment of the requirements for the degree of Master of Arts.

ABSTRACT

This study is a geographic analysis of the land use pattern in the rural-urban fringe zone of Edmonton.

Firstly, it gives a summary of the historical development and the physical growth of the City of Edmonton through time. The dramatic economic and physical expansion which resulted from the most active phase of the provincial oil boom (1947-1957) has been stressed. The number of building construction permits granted and their valuation (in current dollars), have been employed as measures of the variations of the City's rate of growth.

Next, it deals with various aspects of the rural-urban fringe zone. Literature on definition and delineation of the rural-urban fringe zone is reviewed. In order to facilitate a comparison among different parts of the Edmonton fringe zone, the latter was divided into four sub-areas, Strathcona East, Strathcona South, Stony Plain, and Sturgeon. These sub-areas have been analysed geographically with respect to population characteristics, general land use patterns, land use diversity, and degree of transition towards urbanization.

The final section studies aspects of land speculation, property taxation, and real and estimated changes in land values. Numerous examples are given showing how much more valuable urban land is than rural, at least in the short run. The inverse relationship between distance from the

inner fringe zone boundary and land value has been established for this city's fringe zone. Different forms of agricultural adjustments to the urban encroachment on the fringe zone have been investigated. It has been established too, that there is a high negative correlation ($r = -0.85$) between farming intensity and farm size. There is also a relationship between the type of farming and the distance between the farm and the inner fringe zone boundary. It was possible also to construct a model, illustrating the sequence of agricultural land uses in the rural-urban fringe zone of Edmonton, along the lines of von Thünen's model for the agricultural land utilization pattern that develops around a central city. However, there is a basic difference between the two models. In von Thünen's scheme and time, distance was meaningful, exclusively in terms of transportation costs, whereas in this study transportation costs have been concluded to play a relatively subordinate role. This thesis maintains that distance still is the key factor, and that it decides the value of the land within the fringe zone. Thus influences on the land use pattern around a modern, fast-expanding city like Edmonton, are exerted more by variations in land values and associated differences in property taxes, than by variations in transportation costs.

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In no way less important has been the help of my husband Lars who drove the many miles demanded in the reconnaissance of the rural-urban fringe zone, and who took most of the photos included in the thesis. Mr. J. Chesterman and Mrs. Linda Paul are also sincerely thanked for their excellent work, the one on map reproduction, the other on typing the final copy of the thesis. Finally, I am most thankful to the great number of anonymous fringe zone farmers who willingly answered all questions about their farm operations. Their co-operation has been essential and invaluable to this study.

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INTRODUCTION

The Problem

When you walk down Main Street in any large city, each step takes you past several thousand dollars' worth of frontage. Frontage is a common measure of city land, and it goes by the foot, like a precious commodity. A front foot is a foot along the sidewalk with a strip behind it 100-150 feet to the rear of the lot. A foot on the right street is worth whole farms. ¹

In this way M. Mason Gaffney, professor of agricultural economics, starts an essay entitled "Urban Expansion - Will it Ever Stop?" The short quotation points up the central problem treated in this study, viz. the differences in urban and rural land values and the effects these differences have upon the development of a land use pattern in the environs of an expanding city.

Urban land is in great demand, and in rural-urban fringe areas, where there is direct competition between rural and urban land uses, the latter usually take over, since considerably higher prices can be offered for land for urban development than for land which is to remain in farming. The impact of this race for land is often tragic. Due to permitted land speculation, farm land, often the best, is taken out of production first and left as waste land long before any eventual urban development takes place on it. The farmhouses are abandoned and simply left to decay. Since the fringe zone most often lies beyond the

¹ M. Mason Gaffney, "Urban Expansion - Will it Ever Stop?" U.S. Dept. of Agriculture, Yearbook of Agriculture 1958, Washington, D.C., Government Printing Office, 1958, p. 503.

corporate boundaries of the city there is usually a lack of building restrictions and general legislative planning authority for the zone. Therefore the urban development spreads in disorderly patches over the countryside or as strings along communication routes. This haphazard development is today undesirable from economic as well as aesthetic points of view.

The purpose of the study will be:

- 1) to delineate as far as possible the boundaries of the rural-urban fringe zone of Edmonton,
- 2) to give a picture of the present land use situation in it, with special attention being paid to various forms of agricultural land use, and
- 3) to analyse the land utilization pattern in the light of site, location, population distribution, land values and property taxes, and such other factors as are pertinent to the understanding of an urban expansion that never seems to stop.

The Area

The rural-urban fringe zone of Edmonton, as defined for the purpose of this study,² proves to be an almost ideal area in which to study urban encroachment upon agricultural land. First of all, settlement occurred comparatively early in the region which includes the fringe

² Definition, delineation, and extent of the rural-urban fringe zone are discussed in Chapters II and III.

zone. Agriculture formed the economic base for the whole Edmonton region until the late 1940s when an oil boom started a dramatic shift from rural to urban activities. Due to the relatively uniform topography of the area and the generally good quality of the soils, farm settlement spread rather evenly in various parts of today's fringe zone. The area in transition between rural and urban land uses constitutes a narrow band beyond the contiguously built-up edge of the city. The extent of the transition zone varies from one sub-area of the zone to the others, but nowhere has it been observed to exceed a radius of four miles from the inner fringe zone boundary. Public transportation facilities in the form of railroads and roads are relatively evenly distributed throughout the whole city's fringe zone.

Research Methods

In order to describe the extent of the rural-urban fringe zone, several reconnaissance trips by car had to be made in the zone which surrounds the built-up City area. The delineation of the fringe zone was made partly from observations made on these trips, partly by the aid of aerial photographs taken in 1967. When the fringe zone was delineated, the land utilization pattern within it was mapped from the aerial photographs. In addition, a field survey was undertaken to investigate the extent of recent development and change.

The next stage was to obtain information concerning the

actual farming details in the fringe zone. According to the land use map, 230 farms are located within the delineated boundaries of the zone. All of these were visited, but for various reasons, questionnaires were distributed to only about two hundred of these households.³ The respondents were requested to return the questionnaires by mail. Many farmers were interviewed in person about their farm operations, and the information thus received was carefully recorded. The interviews were made mainly in accordance with the written questionnaire. In many instances only some of the questions were chosen and discussed in detail. Altogether, eighty-two questionnaires were returned and of these, sixty-six were completed (33 per cent of the total number of questionnaires).

Though the response was lower than expected, it has been regarded as representative, if combined with the information obtained from the personal interviews. The farms from which questionnaires were returned are distributed relatively equally over the whole fringe zone area.

The total rural-urban fringe zone comprises 125 square miles (500 quarter-sections). The quarter-sections were assumed to be suitable units in which to estimate population density and relationships between non-farm and farm population. The quarter-sections also formed the basis for the calculation of the number and variety of land use units

³ A copy of the questionnaire is submitted in Appendix I.

in the fringe zone.

The value of land is of pertinent importance for the type of farming which will be carried out in a particular area. Information concerning land values in different parts of the fringe zone was obtained from real-estate companies and from the City Planning Department. Farming intensity was measured in terms of annual input of labor per acre of farmland. A correlation analysis showed that there is a relationship between farming intensity and size of farm, for instance, small farm holdings are generally farmed much more intensively than large ones.

Supplementary information for this study was gathered from library research and countless consultations with the different departments of City Hall and branches of the Department of Municipal Affairs. For the historical part of the study, the Provincial Archives of Alberta and the collection of historical documents in the Legislative Building were consulted. Personal interviews and contacts by telephone were made in order to obtain more specific information within the various fields of study.

CHAPTER I

EDMONTON - A FAST GROWING CITY WITH DEEP ROOTS

The Nineteenth Century Growth Phase

The name Edmonton originates from Fort Edmonton, which was built in 1795 by George Sutherland, a Hudson's Bay employee. The trading post was so named in order to honour either Sir James Winter Lake, who owned an estate with that name, or John Peter Pruden, a clerk in the Company, who was born in Edmonton, near London, England.¹

A short time before Fort Edmonton was established, the North West Company had built a post, Fort Augustus, on the west side of the North Saskatchewan River and the Hudson's Bay Company built theirs nearby (Fig. I). The two forts were located some twenty miles east of the present site of the city of Edmonton. There was a gigantic rivalry between the two companies, since both tried to dominate the fur trade on the river. The forts were located close to each other partly because of the possibility of watching each other's trade, but a more important reason was defence, for the Indians on the Plains were known to be aggressive. After some years the forts were destroyed by fire and rebuilt further upstream on the river at the foot of the high

¹ J. G. MacGregor, Edmonton - A History. M.G. Hurtig Publishers, Commercial Printers Ltd., Edmonton, 1967, p. 19.

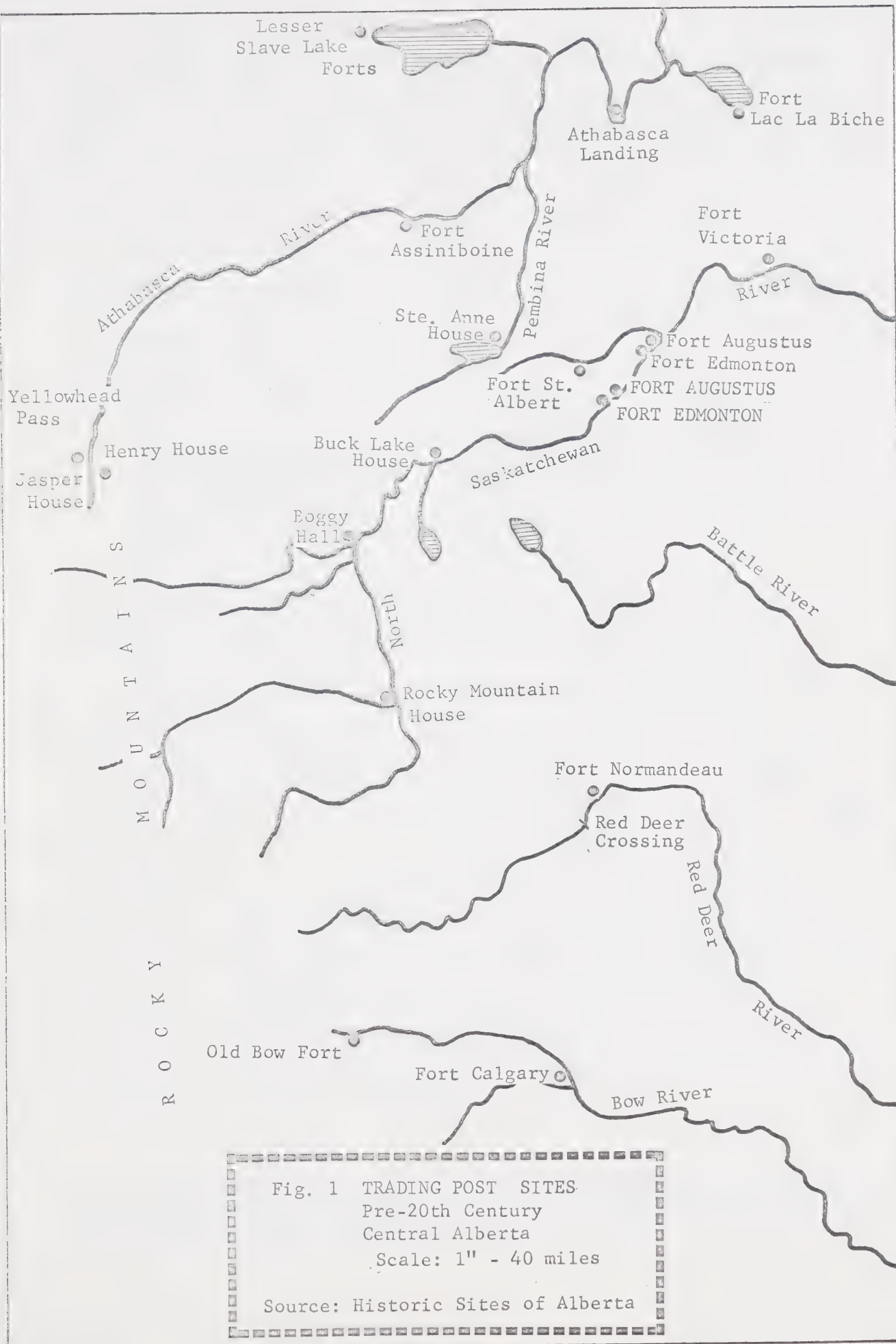


Fig. 1 TRADING POST SITES
Pre-20th Century
Central Alberta
Scale: 1" - 40 miles

Source: Historic Sites of Alberta

river bank within the site of the present city of Edmonton (Fig. 1). In 1821 the North West Company and the Hudson's Bay Company decided to amalgamate and the name Fort Edmonton was kept.

There are not many written documents available in the city of Edmonton on the early Fort Edmonton. Alexander Ross visited the place in 1825 and he was impressed with the agricultural possibilities of the area. He writes:

Attached to this place are two large parks for raising grain and the soil being good, it produces large crops of barley and potatoes, but the spring and fall frosts prove injurious to wheat which in consequence seldom comes to maturity. ²

Ross also noted that there was a well-organised community within the walls of the fort and a good social life.

The river valley has played an important role in the development of Edmonton. The streams were the most convenient means of communication during the first settlement period. Located on the North Saskatchewan River, Fort Edmonton controlled the western Canada fur-trade. A 60 miles long land route connected the Fort with Fort Assiniboine and the Athabasca River, which in turn opened up the Mackenzie territory for trade and exploration. Around the year 1800, connections were established with British Columbia via Jasper House and the Yellowhead Pass (Fig. 1).

² Alexander Ross, The Furbunters of the Far West: A Narrative of Adventures in the Oregon and Rocky Mountains. Smith, Elder and Co., London, 1855, p. 210.

Fort Edmonton, or Edmonton House, which it alternately was called, did not serve only as a trading post; it provided also accommodation for numerous travellers. Paul Kane, who is regarded as one of Canada's great early artists, spent some time at the Fort, and he has given an interesting description of the place. His diary for December 5th, 1846, reads:

...no place in the interior is at all equal to it, either in comfort or interest. All the Company's servants, with their wives and children, numbering about 130, live within the palings of the fort in comfortable log-houses, supplied with abundance of firewood....Provisions are in the greatest plenty, consisting of fresh buffalo meat, venison, salted geese, magnificent whitefish, and rabbits in abundance, with plenty of good potatoes, turnips, and flour....Of wheat they can of course have only one crop; but with very indifferent farming they manage to get from twenty to twenty-five bushels per acre. 3

It is significant to note the quite different opinions the two authors, Alexander Ross and Paul Kane have about the growing of wheat at Fort Edmonton, but both of them may have been correct.

It was not until the end of the nineteenth century that Edmonton started to emerge as more than a fur-trading post. Meanwhile, missionaries had been doing all they could to establish peace with the Indians, and around 1870 the first families dared to settle outside the Fort's walls and most of them got their subsistence from farming. The first surveys

³ P. Kane, "Wanderings of an Artist among the Indians of North America", in J.W. Gavin (ed.), Masterworks of Canadian Authors, The Radison Society of Canada Ltd., Toronto, 1925, pp. 255-256.

had by then been done for the construction of the Canadian Pacific Railway through Edmonton, but business-oriented newcomers soon saw their plans ruined, as the railway route for various reasons was switched to Calgary. The expected railway connection between Edmonton and the Pacific Coast had caused a small land-boom. Speculators, mainly from eastern Canada, bought land at increasingly high prices. The first lots to be sold were parts of the Hudson's Bay Reserve, which included altogether 3,000 acres of land, and as the released part was purchased, speculation continued and the same lots were sold again at still higher prices. The boom lasted for two years and ended when it was learned that the railroad should pass 200 miles to the south.

Nine years later, however, the railway reached Strathcona from Calgary, Strathcona then being a small settlement on the southern bank of the North Saskatchewan River, located immediately south of Edmonton. The Low Level Bridge was constructed in 1899, and the older settlement on the north side of the River was linked to Strathcona. The railroad was extended across the river and the terminal became located at Edmonton.

During the decade before the building of the Edmonton-Calgary railway, there was water traffic of considerable importance on the North Saskatchewan River. The very first of the many flat-bottomed steamers, "The Commissioner", made regular tours between Edmonton and Grand Rapids, near Lake Winnipeg. Until 1915, the ship "City of Edmonton" carried freight and pleasure parties downstream on the River as far as a point

close to Lloydminster. Many ships were wrecked, especially during periods of flood when the water was very treacherous.

In Edmonton and the surrounding urban fringe, there was a slow but steady population increase during these years. With the coming of the Canadian Northern Railway from Winnipeg in 1905, Edmonton established connections with the more densely populated areas in the east, and a new era of development began. In 1892 Edmonton was incorporated as a town, and in 1905 became the capital of the newly organized province of Alberta. Strathcona was incorporated in 1899 and when the University of Alberta was founded in 1906, it was located in the town of Strathcona, in accordance with an agreement that the Capital and the University would not be in the same city.⁴

A second land boom occurred at the beginning of the new century and lasted almost until the outbreak of the First World War. New settlers poured into the provincial capital and the population figure grew from about ten thousand to more than seventy thousand between 1905 and 1914. The towns of Edmonton and Strathcona amalgamated in 1912 and the combined area was then 23 square miles, a figure which was almost doubled (40 square miles) through annexations during the last two years of this early boom period.

By 1880, lots had already been sold from the Hudson's Bay Reserve, but as late as 1912, about two square miles of centrally-located reserved land remained. The settlement had

⁴ J.G. MacGregor, Edmonton - A History, op.cit., p. 165.

in the meantime spread out on all sides of the unpopulated Reserve, and when the Company gave up more lots for sale, there was an enormous rush for them, at high prices (Fig. 2). A marked shortage of money occurred after a couple of years, and caused a collapse of the land boom. Much of the land was repossessed by the Company or became municipality property, when the taxes remained unpaid.

Twentieth Century, Middle Phase - 1902-1947

Table I shows the growth of the population of Edmonton from 1901 to 1967. The table is based on Civic Census (C) or Dominion Census (D) statistics. Annexations from the later part of the period are noted. Figure 3 illustrates graphically the population increase during the same period and also gives a projection of continuing growth up to the year 1980.

According to the table and figure the growth has varied greatly through this period. In 1901 there were 4,176 people living in the city and in 1914 the population had increased to 72,516. The rapid increase originated in a second land boom, associated with the railway connections from both east and south.

In 1902 the built-up areas of the towns of Edmonton and Strathcona were largely concentrated, with some patches of development, along the north side of the river (Figures 4,5, and 6). The municipal boundaries included much unsettled land. The pattern of the post-boom period (1914) shows a quite different pattern (Fig. 7). The built-up sites had naturally increased in area and the general settlement pattern had



Fig. 2 Hudson's Bay Land Sale, 1912

Source: Provincial Archives of Alberta

TABLE I - THE CITY OF EDMONTON,
STATISTICS OF POPULATION 1901 - 1967

Year	Population	Year	Population
1901	4,176 D	1939	90,419 C
1903	6,995 C	1940	91,723 C
1906	14,088 D	1941	93,924 C
1909	27,000 C	1941	93,817 D
1911	31,064 D	1942	96,725 C
1912	53,611 C	1943	105,536 C
1913	67,243 C	1944	108,416 C
1914	72,516 C	1945	111,745 C
1915	59,339 C	1946	114,976 C
1916	53,846 D	1946	113,116 D
1917/1919	-----	1947	118,541 C
1920	61,045 C	1948	126,609 C
1921	58,821 D	1949	137,469 C
1922/1923	-----	1950	148,861 C
1924	63,160 C	1951	158,912 C
1925	65,378 C	1951	158,709 D
1926	65,163 D	1952	169,196 C
1927	67,083 C	1953	183,411 C
1928	69,744 C	1954	197,835 C
1929	74,298 C	1955	209,353 C
1930	77,557 C	1956	223,549 C
1931	79,059 C	1956	224,003 C
1931	79,197 D	1957	238,353 C
1932	78,387 C	1958	252,131 C
1933	79,231 C	1959	260,733 C
1934	79,773 C	1960	269,314 C
1935	82,634 C	1961	276,018 C
1936	85,470 C	1962	294,967 C
1936	85,696 D	1963	303,756 C
1937	87,034 C	1964	357,696 C
1938	88,887 C	1965	371,265 C
		1966	381,330 C
		1967	393,563 C

Source: City Assessor

* Beverly Annexation

** Jasper Place Annexation

Code: C - Civic Census

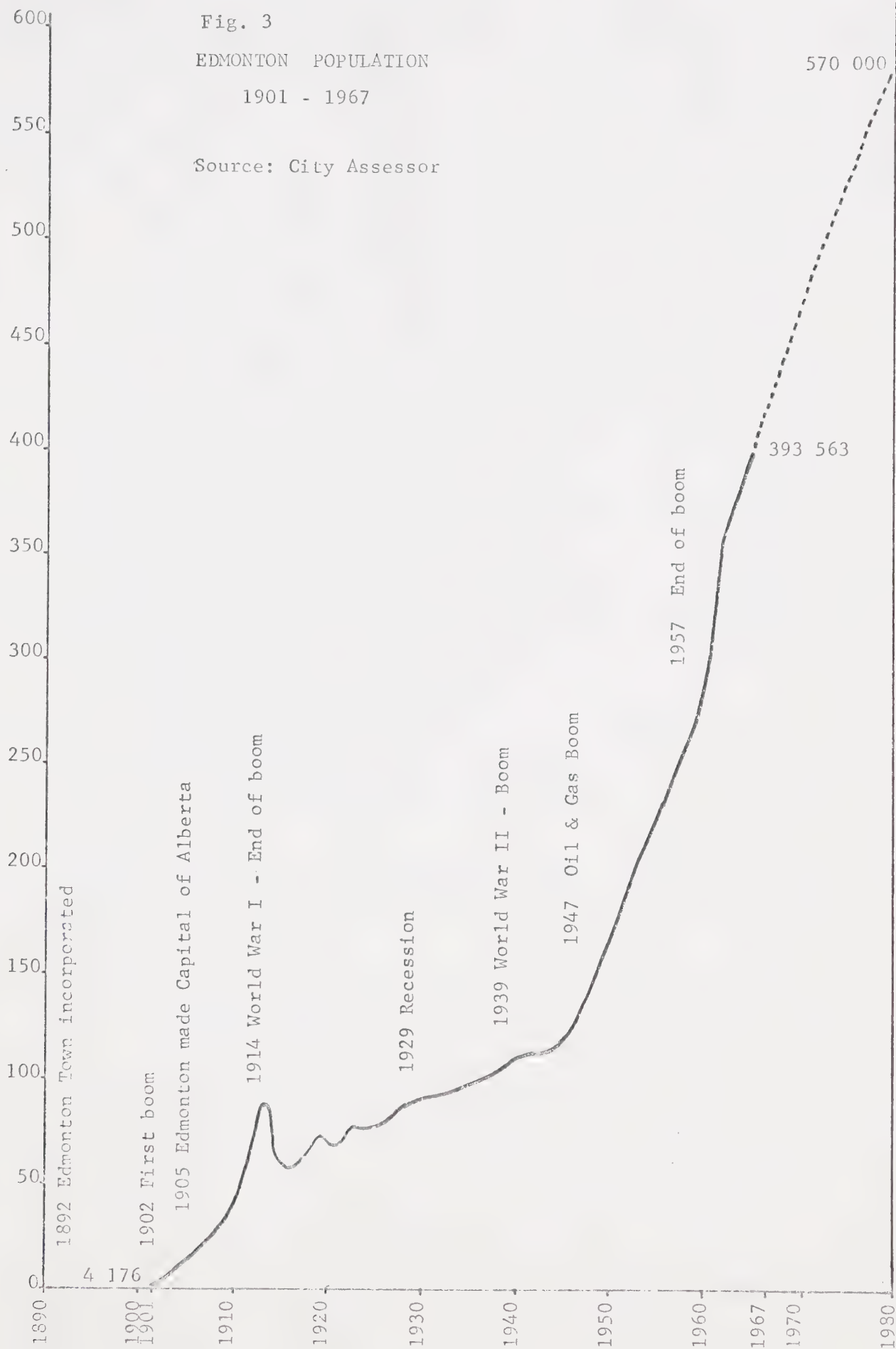
D - Dominion Census

Population
(thousands)

Fig. 3

EDMONTON POPULATION
1901 - 1967

Source: City Assessor



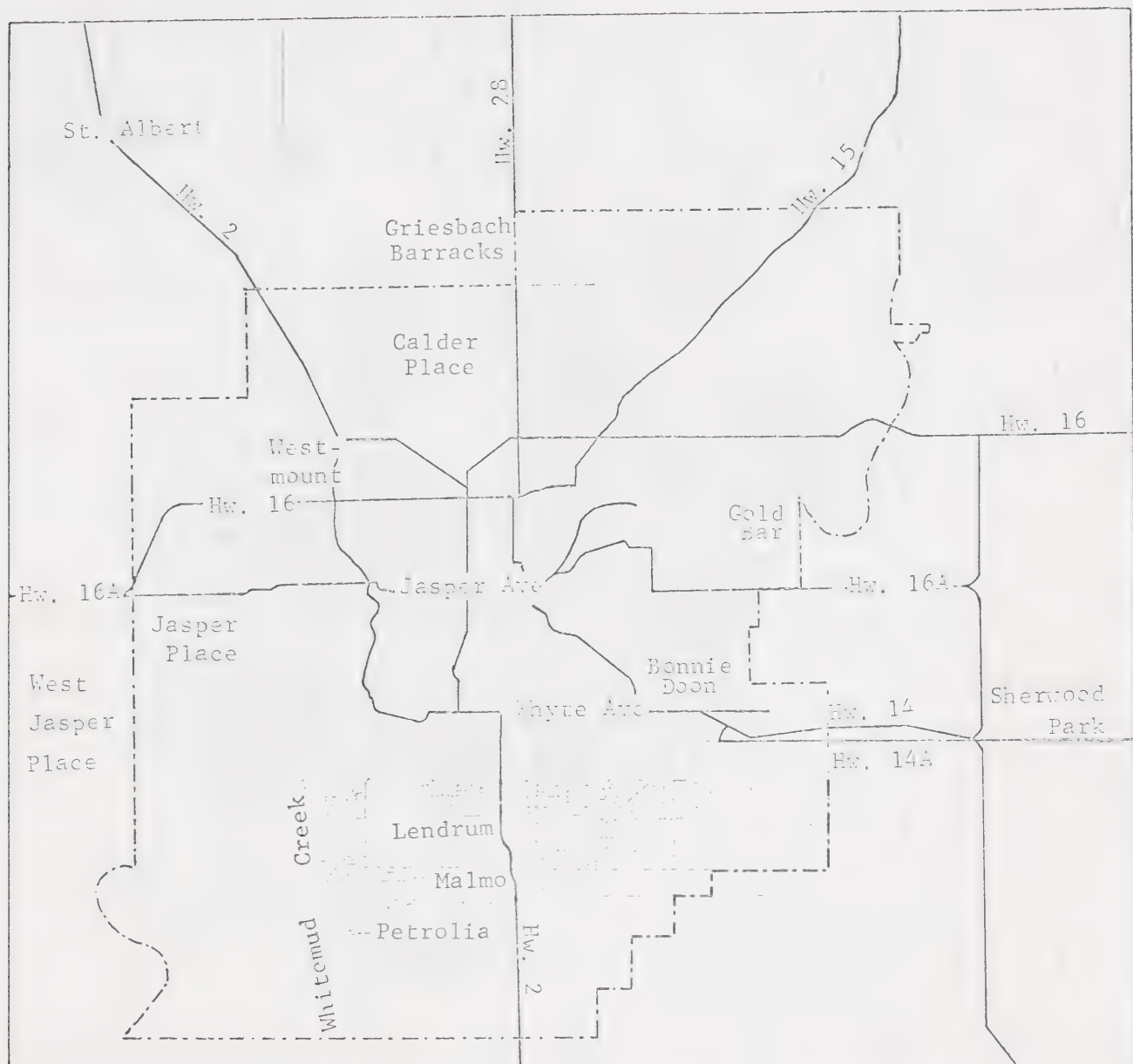


Fig. 4 City of Edmonton

LOCATION MAP

Scale: 1" - 1.1 miles

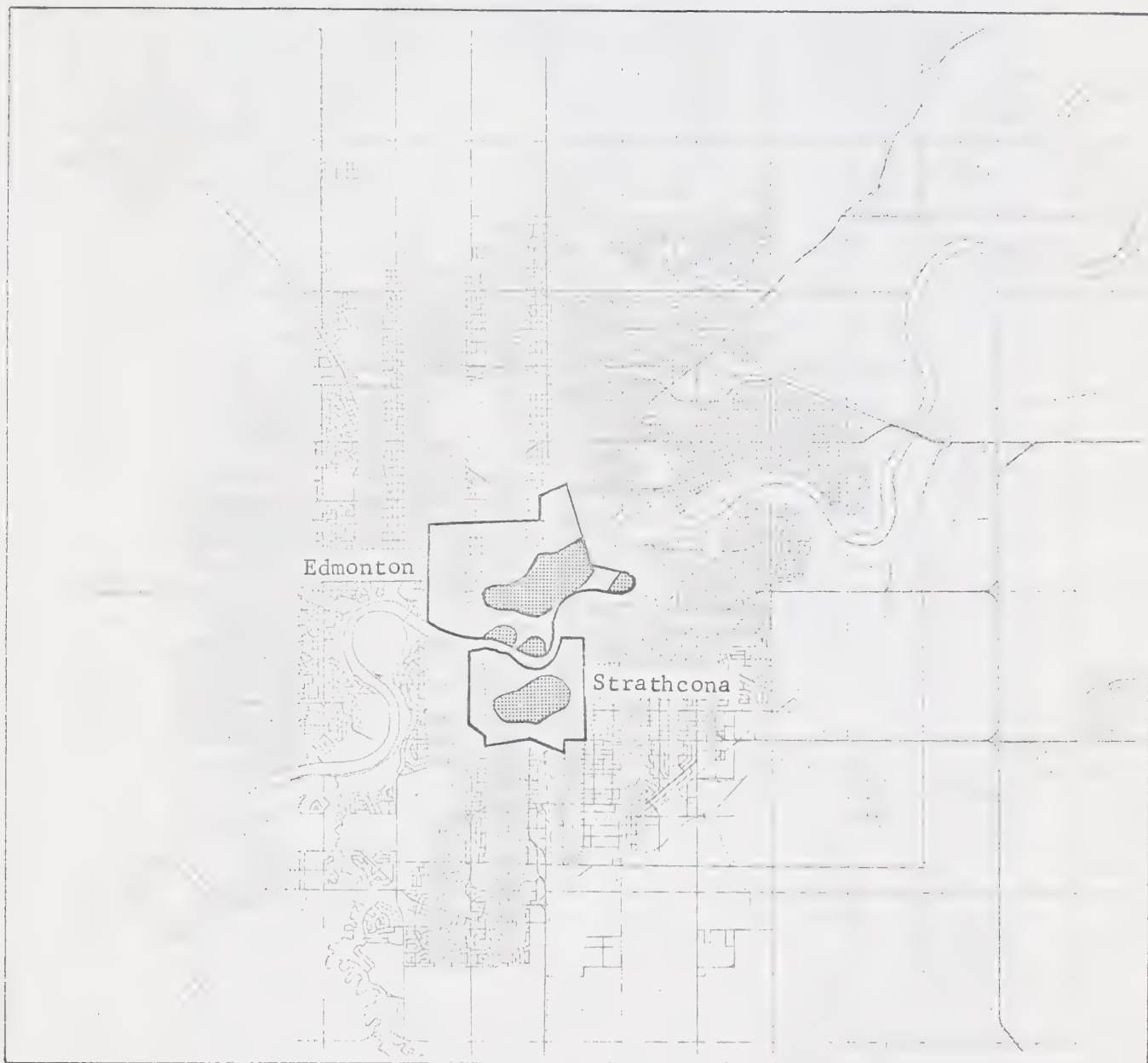


Fig. 5 Towns of Edmonton and Strathcona

BUILT - UP AREA, 1902



Extent of the built-up area



City Boundary

Scale: 1" - 1.1 miles

Source: City Planning Department



Fig. 6 Whyte Avenue, 1903, Looking West

Source: Provincial Archives of Alberta



Fig. 7 City of Edmonton

BUILT - UP AREA, 1914



Extent of the built-up area



City Boundary

Scale: 1" - 1.1 miles

Source: City Planning Department

changed from one of concentration to one of peripheral fringe growth. There is clear evidence of ribbon growth along the main streets; Jasper Avenue, Whyte Avenue, and 101 Street, and the railroads. No building construction, by 1914, had taken place in the Hudson's Bay Reserve, located slightly northwest of the main built-up area. A smaller parcel of land, the Calder Place near today's municipal airport, was then under development. The municipal boundaries of 1914 are indicated in the figure. They illustrate great extension by comparison with those limits of 1902. Urban growth as such had still not occurred on nearly three-fourths of the total city area of 1914. In fact, a considerable part of this unimproved land had been taken over by the city for tax delinquency during the depression years preceding the First World War. The economic conditions during these first years of the century are exemplified by the number of building permits granted (Table II and Fig. 8). The first available figures are for 1905, and show that 345 permits were granted. The peak was reached in 1912 with 3,664 permits. After that year there was a downward trend with only 1,678 permits in 1914. Actually, it did take more than another thirty years before the figure of 1912 was reached or exceeded.

A new period of development was initiated in the latter part of 1914. General depression was prevailing; the original source of prosperity for the city, the two railway companies, went bankrupt; and the many investors lost their capital.⁵

⁵ Ibid., p. 214

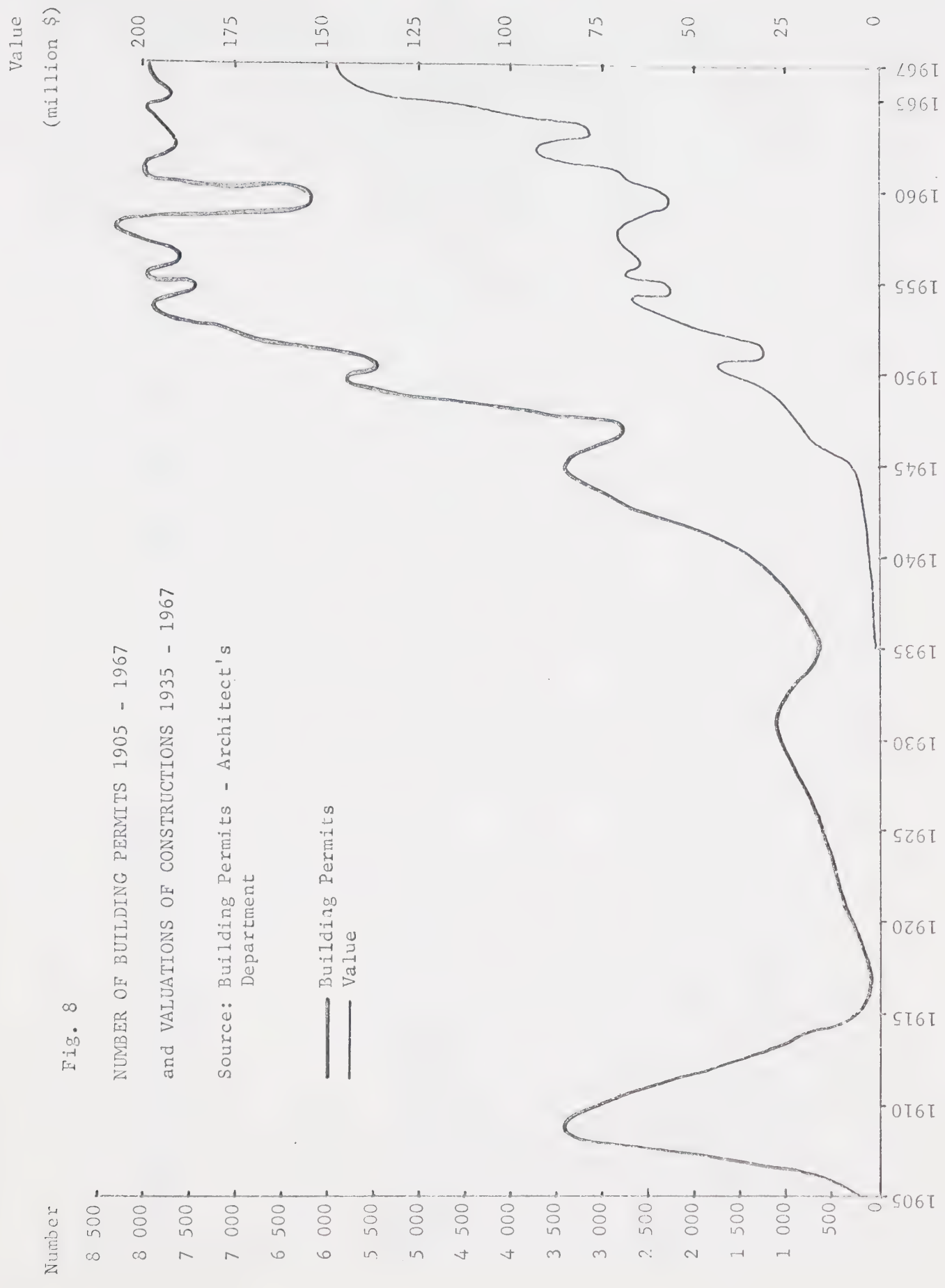


Fig. 8

NUMBER OF BUILDING PERMITS 1905 - 1967
and VALUATIONS OF CONSTRUCTIONS 1935 - 1967

Source: Building Permits - Architect's
Department

Building Permits
Value

TABLE II - THE CITY OF EDMONTON, STATISTICS OF
BUILDING PERMITS 1905 - 1967 WITH VALUATIONS
OF CONSTRUCTION

Year	No. of Permits	Value (\$)
1905	345	— — — — —
1906	932	— — — — —
1912	3,664	— — — — —
1914	1,678	— — — — —
1915	247	— — — — —
1916	109	— — — — —
1917	114	— — — — —
1918	126	— — — — —
1919	307	— — — — —
1920	371	— — — — —
1925	590	— — — — —
1930	1,166	— — — — —
1935	651	676,535
1940	1,442	2,636,870
1945	3,361	7,988,348
1946	3,661	15,020,453
1947	2,805	13,182,665
1948	4,079	27,123,329
1949	5,792	40,050,063
1950	5,785	46,579,684
1951	5,343	36,394,684
1952	5,967	37,066,526
1953	7,085	55,023,816
1954	7,700	68,329,716
1955	7,437	58,718,696
1956	7,962	69,406,035
1957	7,529	64,344,758
1958	8,173	72,517,144
1959	6,836	70,907,538
1960	5,925	56,166,520
1961	7,407	68,678,700
1962	8,068	90,345,489
1963	7,581	75,779,745
1964	7,527	100,854,661
1965	7,951	125,275,819
1966	7,490	135,568,720
1967	7,816	141,083,741

Source: Building Permits - Architect's Department



Fig. 9 Jasper Avenue, 1914, Looking West

Source: Provincial Archives of Alberta

A new company, the Canadian National Railway, emerged, with governmental support, from the remnants of the Grand Trunk Pacific and Canadian Northern Railway Companies. Two lines of provincial railroads were under construction northwards to the Peace River area and the hamlet of Lac La Biche, giving access to millions of acres of potential farmland. A new kind of wheat, which would ripen on the prairies before being ruined by the early frosts had been developed on a farm in Ontario,⁶ and became increasingly used by the Alberta farmers. Wheat had become the most demanded grain, and resulted in good prices and increased acreage.

Edmonton's population dropped off to 53,846 by 1916 (Table I). Some of the decrease was due to men enlisting for war service, but the rest was caused by people moving out when they could no longer find employment or a livelihood in the city. Their lots were taken over by the City when their taxes were not paid. Calgary became a tempting goal for many, since natural gas and oil had been discovered there in 1912, and that city experienced a small boom period, in spite of world depression, and at the expense of Edmonton. Hope for the unemployed in Edmonton was given when, in 1914, gas drilling gave results and the well at Viking, 80 miles southeast of Edmonton sprang into gas fame. Nine years later the first gas line reached the provincial capital, and many Edmontonians, living on mining the local coal, saw their industry decline due to this fuel competitor. After

⁶ Ibid., p. 93.

the war, there was a population increase again, partly due to the return of the soldiers.

In 1918, the Spanish influenza paralysed the world in epidemic proportions. The first cases in Edmonton occurred on October 19th. A temporary hospital was set up in Pembina Hall at the University. At the end of the month 2000 cases were reported, of which forty-four were fatal. The epidemic was ended before the start of the new year. Over the whole province, 30,000 had caught the disease, and in Edmonton there were 445 reported fatalities.⁷

Very little urban growth occurred between 1914 and 1924, mainly due to the world economic situation, but also due to the fact, that there were almost 10,000 less people living in the city at the end of the period than at the beginning. As indicated by Figure 10, new development had taken place along both sides of the River, but only on a relatively small scale. The main growth points had been the northern fringe areas, beyond the former Hudson's Bay Reserve, which still, in 1924, remained unpopulated. During the war period, few building permits were requested or granted - only 109 in 1916 - but immediately after the war, construction work started again (Table II and Fig. 8). Even though the economic conditions became slightly improved after 1918, the years between 1914 and 1924 can rightly be considered as a continuation of the depression period.

⁷ Ibid., p. 224.

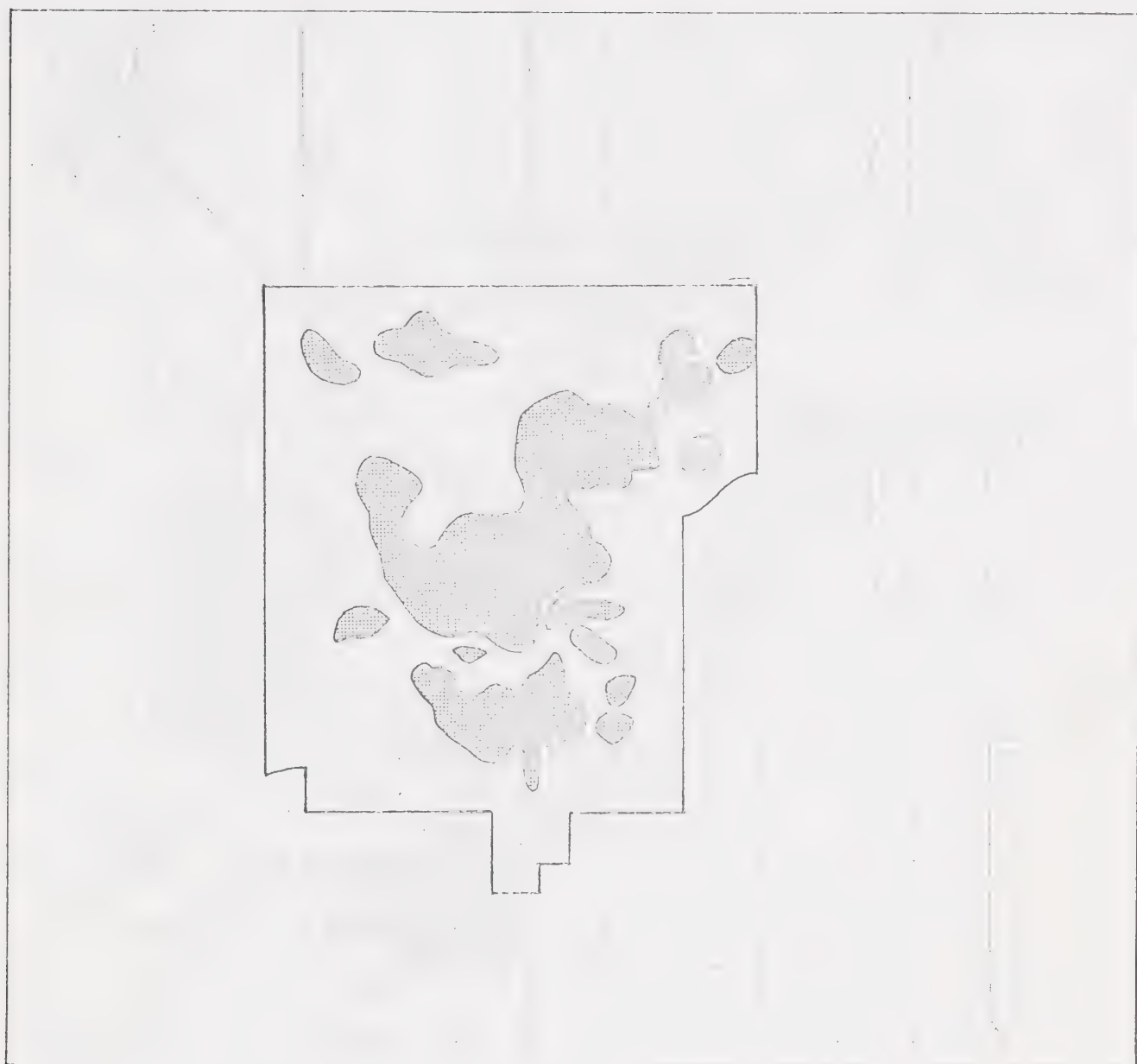


Fig. 10 City of Edmonton

BUILT - UP AREA, 1924



Extent of the built-up area



City Boundary

Scale: 1" - 1.1 miles

Source: City Planning Department

The extension of the legal boundaries of the city did not undergo any major changes during these eleven years. About a quarter of a square mile was annexed in the south, and a slightly larger area, including a portion of the southern river bank between White Mud Creek and the North Saskatchewan River, was on request released in 1924. This latter area was later re-annexed.

1925 introduced a new period of development. Edmonton had by then almost recovered from the depression and experienced a short economic rise, before the general world recession in 1929. The short-lived economic boom was due to a tremendous output of wheat in the region around the city. This caused the government to erect a wheat terminal elevator in the northwest corner of the city. New agricultural settlement also took place during the period, mainly in the Cold Lake area north of Edmonton. During the first years of the 1930s the full depression came about, slowing the pace of all forms of urban development for a time. However, the last two or three years before the outbreak of the Second World War (1939) brought back better economic conditions. As an example, Canada Packers started a new and modern meat-packing plant and provided 300 men with employment, and Eaton's Stores, already established in the city, started construction on the main store, which still is in operation.

Already at the beginning of this period, automobiles had become a significant element of the city's transporta-

tion, and the wide, straight streets of the earlier period left plenty of room for traffic. Although spacious, the streets were generally in poor condition, and only Jasper Avenue and Whyte Avenue and their side streets were paved. Usually all paving stopped a block or so away from the two main avenues, and the rest of the streets were gravelled or mud-packed. Public transportation was provided by street cars, the lines of which stretched over large, unpopulated areas towards outlying suburbs, such as Bonnie Doon and the packing plant community of North Edmonton.

Although Edmonton's population increased, at times this growth was very slow. In 1924, Edmonton had 63,160 inhabitants (Table I). Between 1928 and 1929 there was a sudden increase and the population figure for the recession year was 74,298, which exceeded the figure for the record year of 1914 by almost 2,000 people. Factors contributing to the increase were first of all the discovery of gold in the Great Slave Lake area in the north. This made Edmonton the main supply base for the numerous prospectors, as the Klondyke gold rush had done at the end of the nineteenth century. Secondly, a devastating drought had struck the eastern parts of the Prairie Provinces between 1927 and 1929 and forced thousands of impoverished farmers to leave their homes for the West and North. Many of them resettled in the Peace River area, which had recently become available for homesteading.

Edmonton, because of its geographic situation and its

acquired infrastructure came to serve as a Gateway to the North, fully equipped with railways and air lines. By 1937 the Municipal Airport, which officially was designated "Air Harbour" in 1926, had forty-four planes at work, many of them with destinations to the mining districts of Yellowknife and Great Bear Lake. The numerous service industries of the city flourished and provided employment possibilities for an increasing number of people. This caused many presumptive land-seekers to change their plans for the trek to the north and to settle permanently in Edmonton.

Almost no change of the population trend occurred during the recession years, but when the economic conditions started to ameliorate again, there was a continuous increase in population, and at the time of the outbreak of the Second World War, the City had 90,419 inhabitants.

The City itself did not change much during the 1930s, a fact which is verified by the low number of building permits (Table II, Fig. 8). Still there were thousands of empty lots, also along the main streets. Edmonton with its far-flung boundaries, was described as "the largest city in Canada with the least population".⁸ The City presented almost the same face to a visitor in 1939 as it had shown to the incoming land speculators in 1912. Little new construction had taken place along the central avenues. The main changes occurred as suburbs were created in the northwest

⁸ Ibid., p. 226.

and northeast. The slow progress of the city can be studied in Table III below. Mileage of paved streets, water mains, and sewers has been chosen here as criteria of progress.

TABLE III - CITY OF EDMONTON, MILEAGE OF STREET PAVING, WATER MAINS, AND SEWERS 1914 - 1939

	1914	1920	1925	1936	1939
Street Paving	46	49	51	58	62
Water Mains	155	165	186	246	248
Sewers	141	152	171	206	210

Source: City Engineering Department

The length of paved streets had increased only by 16 miles during these twenty-five years. The mileage of water mains and sewers increased comparatively more, since these facilities were to be provided also to outlying homes.

According to Figures 10 and 11, there had not been any change in the city boundaries during this period. The southern part of the city, Strathcona, had undergone very little development. Of note is the growth of the University area, reflecting a great demand for education during the depression period. The main growth had occurred in the north, and the northern part of the Hudson's Bay Reserve had been taken over by the Municipal Airport. The establishment of the packing plant in the northeast caused considerable industrial and residential expansion there.

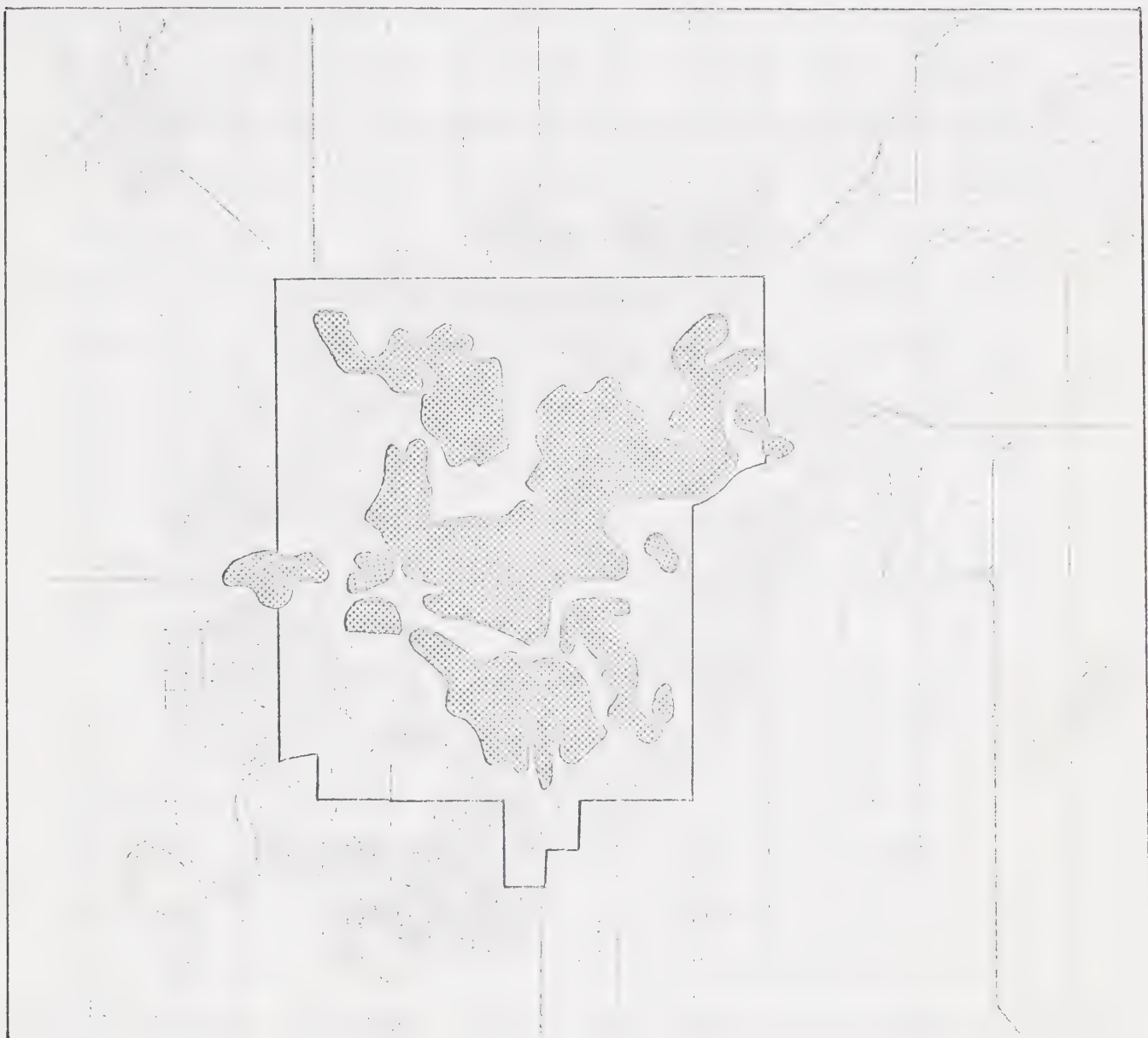




Fig. 11 City of Edmonton

BUILT - UP AREA, 1939

 Extent of the built-up area
 City Boundary

Scale: 1" - 1.1 miles

Source: City Planning Department

During the hard years of the 1930s, many tax-burdened town residents moved out beyond the western limit of the city and settled in an area which was called Jasper Place.

The homes were often built on small lots, which lacked all utility services. Urban settlement had also spread beyond the northeastern border, connecting the small coal community of Beverly with the city. Before the Viking gas field had started to provide cheaper and more convenient fuel for Edmonton's different needs, the community had experienced some booming years. During this period, Beverly had been incorporated as a town and, by 1929, had a population of about one thousand people.

The second period of the middle phase of Edmonton's development comprises the years between 1939 and 1947. Despite war-time expenses in connection with the support of troops overseas, Edmonton witnessed economic progress and prosperity. The city became a strategic center for the American defence of Alaska, and from the municipal airport, huge airlift operations took place. In a later stage of the war, it was decided to construct a satellite military airfield at Namao, a place some ten miles north of Central Edmonton. In the meantime, the Americans had constructed the 1,523 miles long Alaska Highway, an undertaking which earlier had been considered as impossible. As a result of the influence of the highway and airfield, the demand for oil increased considerably. This resulted in the building of a 500 miles long pipeline from the Norman Wells field on

the Mackenzie River, to a refinery at Whitehorse. The American Northwest Service Command erected one of its main offices in Edmonton and so did a consortium of contractors of the two gigantic projects, the pipeline and the Alaska Highway. There was a veritable invasion of Americans into the city. These factors created an economic upswing of the service industry, and improved the general economic conditions.

Edmonton's manufacturing industry played a certain role in the production of munitions and equipment, and the increasing demand for farm products, extorted rationalizations in the farming industry. Still the hope of finding oil and gas in significant quantities was not given up, and thousands of dollars were invested every year in the oil drilling enterprises in different parts of the province.

Although the economic situation for the city was favourable during this war, there was in general an increasing concern for the future. Some construction of new service establishments had taken place but with the withdrawal of the Americans after the war, it was expected that the city would be over-provided with them. Neither were the prospects for agriculture bright, and for the coal industry there was no hope, since immediately after the war, gas and oil would again replace coal. The City Council and the Chamber of Commerce made strenuous efforts to attract new industry, but their efforts were unsuccessful, as the area offered little to any major resource industry other than agriculture.

Edmonton, at the time of the outbreak of the war, had 90,419 inhabitants and seven years later had increased by about twenty-four thousand (Table I and Fig. 1). The number of approved building applications accelerated during the period and reached 3,661 in 1946. The value of construction doubled between 1945 and 1946, even though the number of permits was almost the same. This fact indicates differences in the building aim, direction, and costs.

The legal boundaries remained unchanged during the war. Many of the former empty lots in the central City area were built upon, absorbing a great deal of the population. The main development still occurred in the north. Notable was the change which had taken place at the Municipal Airport. The community of Jasper Place had also undergone great expansion, mainly in areas beyond the City boundary (Fig. 12).


In 1947 at Leduc, a small community some 17 miles south of Edmonton, the hitherto futile oil search finally produced results, one which exceeded all expectation. "Leduc Well Roars With Oil", boasted the headline of The Albertan on Friday, February 14, 1947, the day following the discovery at Imperial Well, No. 1. There was "a roaring column of burning oil and gas shooting flames up 50 feet into the air and clouds of dense black smoke hundreds of feet into the sky".⁹

⁹ C.O. Nickle, "Leduc Well Roars With Oil". The Albertan, Friday, February 14, 1947, p. 1.



Fig. 12 City of Edmonton

BUILT - UP AREA, 1947

 Extent of the built-up area
City Boundary

Scale: 1" - 1.1 miles

Source: City Planning Department

The discovery of oil at Leduc introduced a new phase in the economic and physical development of the City of Edmonton.

The Oil Phase (1947 - 1957)

The oil brought prosperity into the Edmonton area. Reports on new, promising wells came pouring in and it looked as if these discoveries were never going to stop. Millions of dollars were invested in the oil industry, including related activities such as well servicing, pipe line construction, new manufacturing plants, offices and housing for the numerous people who came to work in the oil business. The main petro-chemical industry was established outside the eastern city limits, but many oil-based industries also grew up within the city itself. Only a small fraction of the money invested came from within Alberta. The major part came from "the mighty neighbour to the south".

The oil boom caused a drastic shift from rural to urban activities. After being the most important resource for the province, agriculture now took a secondary role as an economic support source. Many farms were abandoned for the more profitable oil industry, and farmlands were consolidated into larger units for the benefit of those who remained in the rural areas.

The most dynamic phase of the oil boom occurred between 1947 and 1957. At the end of this decade, the growth became less dramatic though the economic conditions remained unusually good.

During this ten-year period, Edmonton's population

leaped ahead from 118,541 to 238,353 persons, an increase of more than 100 per cent. One overwhelming problem was to provide accommodation for the new-comers. The construction industry was kept busy in the building of homes, motels, hotels, and apartments. In 1955 the city got its first high-rise apartment, the Savoy Plaza, along Jasper Avenue. It was a seven storey construction, containing eighty-six dwelling units. Shopping facilities were increased, and a new type of market place appeared in 1955 - the shopping center - of which the Woodward's Westmount became the first in Edmonton.

In regards building permits, 1956 was a peak year, with almost eight thousand permits granted, representing a total value of more than sixty-nine million dollars (Table II). The great building activity was followed by an increased demand for the extension of the street system, and water and sewerage utilities, which the city undertook to provide.

In 1949, Edmonton got its first town planner, Noel Dant, and under his direction several of the older residential areas were improved. In many cases new surveys were made, followed by re-subdivision of land. During the first part of this growth period, most building occurred on the remaining empty lots in the central part of the city. This vacant land was rapidly filled up and by the end of 1947, the city had to acquire additional land from the Municipality of Strathcona. Significant annexations occurred in 1954 and 1956 when the city took over a total area of two and a half

square miles in the Gold Bar District, located on the eastern fringe of the city. The adjustments of the city boundaries, which occurred during these ten years and the general growth pattern of the city are shown in Figure 13. A smaller area along Highway 2 South was temporarily released on request from the Municipal District of Strathcona.

Although the expansion of the built-up area has occurred in all directions, it is most evident in the west, where residential development has filled up almost all of the vacant land within the City boundaries. Settlement had further spilled over the boundary and thus linked Jasper Place to the city physically. At the time of the first oil discovery in 1947, Jasper Place had a few hundred inhabitants. By 1955, the population had grown to 13,594, five years after it had been incorporated as a town. However, the structure of the town caused it to be regarded more as a suburb of Edmonton than as an independent urban settlement, since there were no industries and no major commercial establishments; the function was mainly residential.

The town of Beverly in the northeast also grew fast. This caused financial problems for the local Town Council. No industrial development had taken place after the last coal mine had closed in 1952. The people commuted to Edmonton for work or to the oil-based industry further east across the river.

In recent years, Edmonton has consolidated its position as the center of a large, metropolitan area. Figure 14



Fig. 13 City of Edmonton

BUILT - UP AREA, 1957



Extent of the built-up area



City Boundary

Scale: 1" - 1.1 miles

Source: City Planning Department

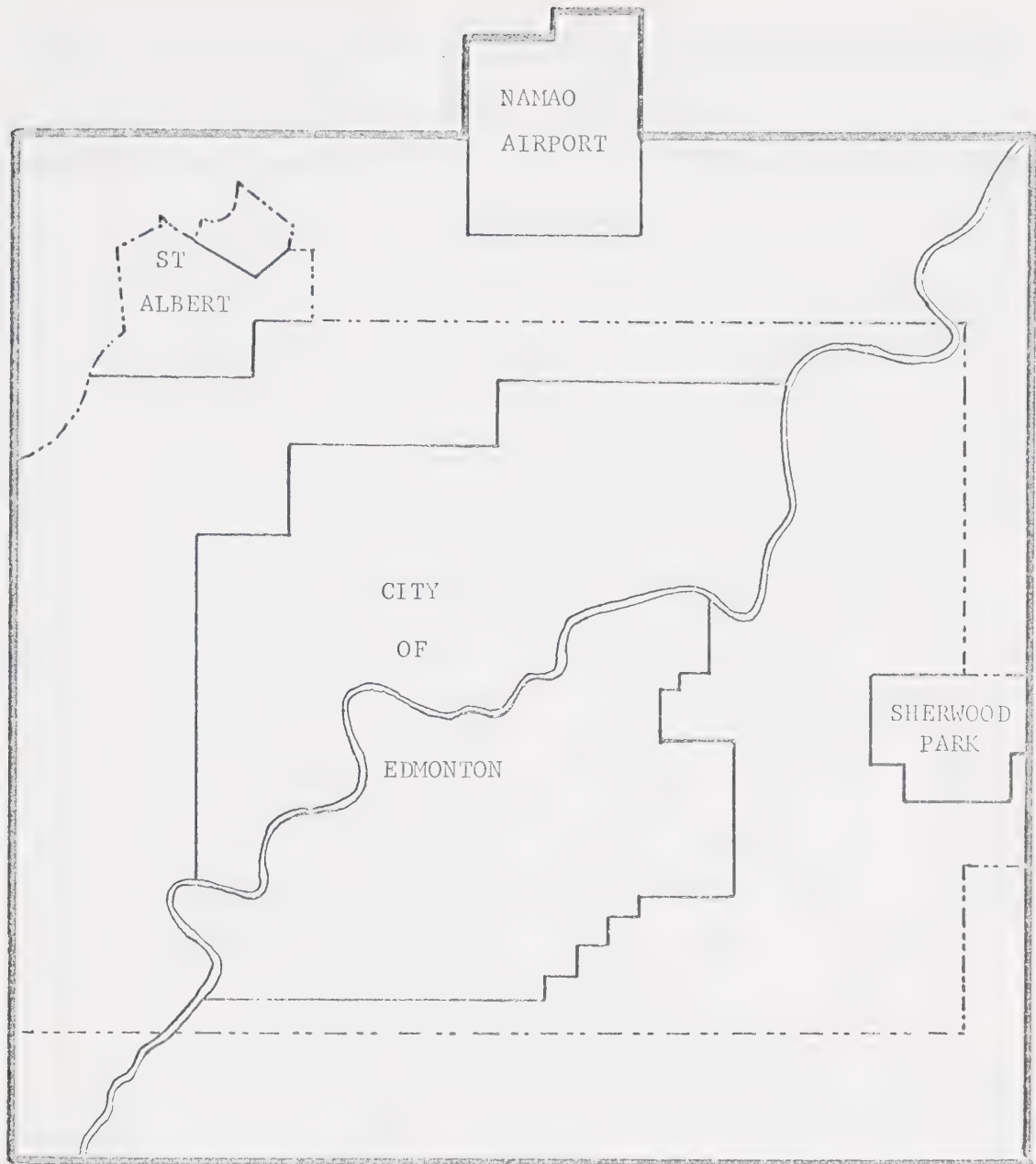


Fig. 14

HANSON RECOMMENDED
METROPOLITAN AREA
EDMONTON 1968

Legend

- Municipal Boundary
- - - - D.B.S. Census Metropolitan Area
- Recommended Metropolitan Area

Scale: 1" - 3 miles

Source: Doctor E.J. Hanson's Report concerning
the Edmonton Metropolitan Area.

shows the present Dominion Bureau of Statistics Census Metropolitan Area boundaries. The population of the city proper grew from 238,353 to 393,563 people between 1957 and 1967. This indicates an average annual increase of 6 per cent (Table I). The population of the total metropolitan area increased during the same decade from 266,245 to 420,290 people, which also gives an average annual increase of 6 per cent (Table IV). The population projections in this table, made by the City Planning Department, point out a probable population of 570,000 for the city proper, and 638,000 within the urban and fringe zone area in 1981. This projection shows that the city is more likely to increase its population figure than is the whole metropolitan area. According to the projection, the city proper should have an average annual increase of 4.7 per cent, while the metropolitan area should increase by 4.4 per cent per year. The calculations are based on the boundaries of 1967.

Table V shows the population development in St. Albert and Sherwood Park, both located within the metropolitan area of Edmonton. The two communities have experienced a considerable population growth during the 1960s, and the trend for the future points to a substantial increase. Thus Sherwood Park is projected to reach a population figure of about twenty-five thousand in 1981 and St. Albert one of thirty-five thousand the same year. The rural part of the population of the metropolitan area increased at the beginning of the 1960s but later on declined, a trend which is assumed

TABLE IV - THE METROPOLITAN EDMONTON
POPULATION STATISTICS FOR METROPOLITAN EDMONTON 1950-1981

Year	Population	Increase	Year	Population	Increase
1950	161,194		1960	317,528	
		11,881			20,040
1951	173,075		1961	337,568	
		11,056			8,312
1952	184,131		1962	345,880	
		17,130			14,584
1953	201,261		1963	360,464	
		16,959			13,342
1954	218,220		1964	373,806	
		14,090			22,445
1955	232,310		1965	396,251	
		18,694			10,197
1956	251,004		1966	406,448	
		15,241			13,842
1957	266,245		1967	420,290	
		19,744			56,710*
1958	285,989		1971	477,000*	
		15,954			161,000*
1959	301,943		1981	638,000*	
		15,585			

Source: City Assessor

* Projected figure

to continue according to the projections made by the City Assessor (Table IV). On the contrary, E.J. Hanson in his study of Metropolitan Edmonton projects that the rural population within the metropolitan boundaries will increase by about one thousand people up to the year 1981, as it is expected that often it will be families that will settle in rural areas located immediately outside the corporate city.¹⁰

¹⁰ E.J. Hanson, The Potential Unification of the Edmonton Metropolitan Area. A Fiscal Study of Annexation and Amalgamation, Edmonton, Alberta, 1968, p. 62.

TABLE V - THE CITY OF EDMONTON,
POPULATION STATISTICS FOR PART OF, AND TOTAL METROPOLITAN AREA, 1961-1981

Year	Edmonton, Beverly, Jasper Place	St. Albert	Sherwood Park	Rural	Metropolitan Total
1961	314,824	3,960	2,538	5,817	327,139
1962	327,127	5,250	3,340	10,163	345,880
1963	339,234	6,880	3,950	10,400	360,464
1964	357,696	8,583	5,400	10,590	382,269
1965	371,265	9,426	5,900	9,660	396,251
1966	381,330	9,828	6,200	9,090	406,448
1967	393,563	10,243	7,000	9,484	420,290
1971*	442,500	15,000	10,000	9,000	477,000
1981*	570,000	35,000	25,500	7,500	638,000

Source: City Assessor

* Projected figures

In his study, completed in March, 1968, Hanson recommends a considerable expansion in all directions for the City of Edmonton, from the present area of about eighty-six square miles to 292 miles. The enlarged City would include the whole metropolitan area, which according to the report "would be a superior arrangement to the current situation".¹¹ The recommended metropolitan area is shown in Figure 14.

Information on the extent of urban growth for the city proper up to the summer of 1968 was taken from areial photographs for 1967. This was supplemented by a close field survey over areas of recent development. As Figure 15 shows, the developed area has grown very much during the past ten years, and it has proved advisable to extend the city limits considerably in order to attempt to keep pace with the growth. The great expansion of the boundaries is clear from Figure 15, but is better illustrated by numbers; in 1957 the city comprised 44.07 square miles, while ten years later various annexations had increased the area to 85.59 square miles. Annexations have occurred in all directions around the city, but still urban development has been spreading over the boundaries, especially into the north-eastern part of the County of Strathcona.

One of the more important annexations occurred at the end of 1961, when the city acquired eleven square miles from the Municipal District of Sturgeon, part of which was the former town of Beverly, which had a population of 9,041. The largest single annexation, population-wise, took place

¹¹ Ibid., p. xiii

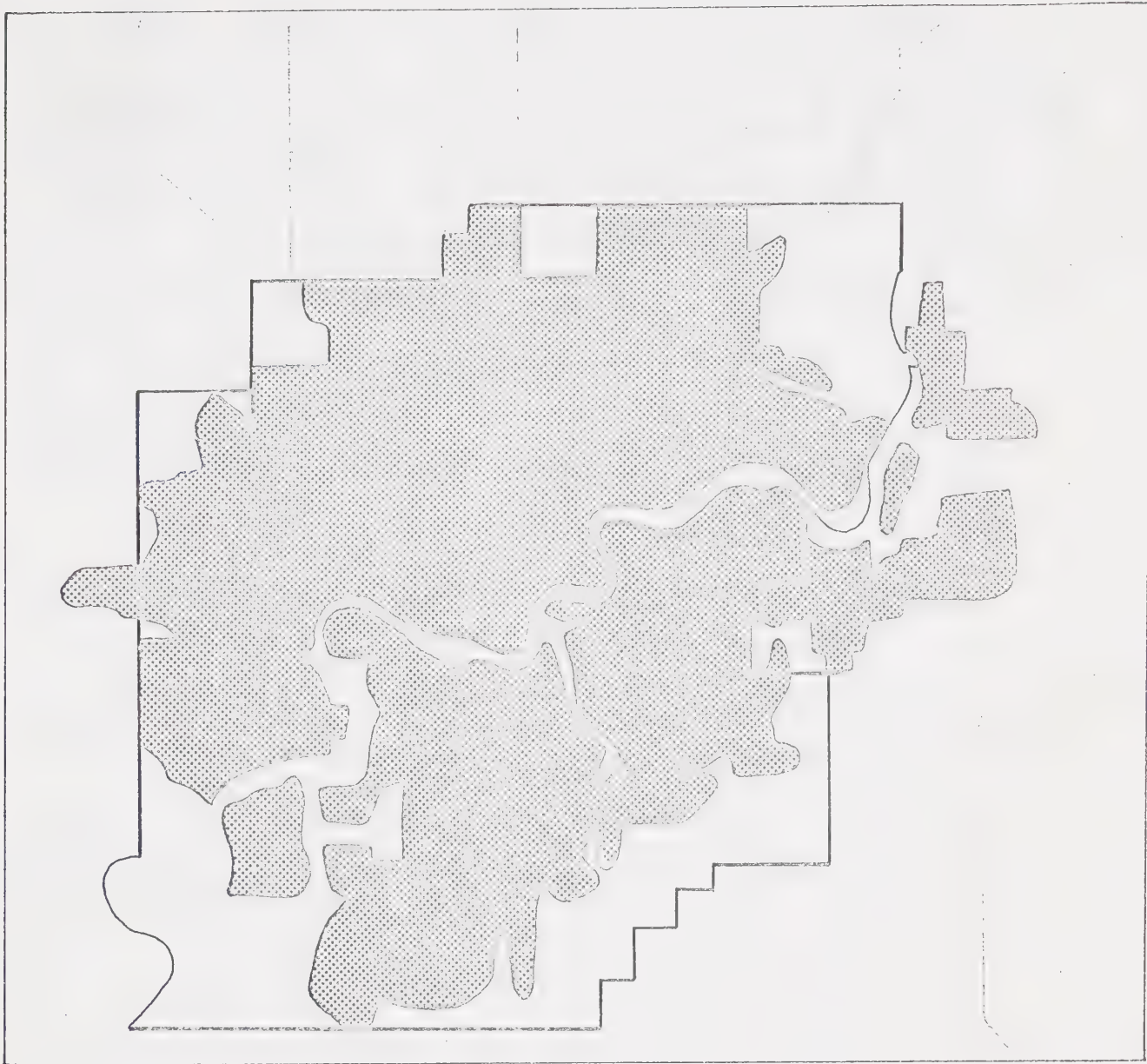


Fig. 15 City of Edmonton

BUILT - UP AREA, 1968



Extent of the built-up area



City Boundary

Scale: 1" - 1.1 miles

Source: Aerial photographs
and field survey

three years later, when the town of Jasper Place became united with the city, adding 38,441 to Edmonton's population. The city limits have not undergone any changes since the Jasper Place annexation in 1964, but at the beginning of 1967, the City Council approved in principle a plan to extend the city boundary. The City Planning Department made a review study over a particular area west of 170 Street and south of Highway 16; the West Jasper Place.¹² No final decisions concerning annexation have been published.

Figure 16 gives a summary of the expansion of the city from the first two settlements, Edmonton and Strathcona, located on each side of the North Saskatchewan River. After the amalgamation of the two towns, the main growth was concentrated in the urban fringe areas on the north side of the river, a trend which was prevailing as late as 1956. An interesting change of the general growth pattern can be observed from 1957, which was the first year to show any significant population increase on the south side. Thousands of new homes have sprung up in the new subdivisions such as Landsdowne, Malmo Plains, Lendrum Place, and Petrolia (Fig. 4). Still on the south side, but in the eastern fringe areas, mainly outside the city boundary, a comprehensive industrial development is expanding over former agricultural areas. The location of such developments, especially of the heavier type of industry, to the outskirts is suggested

¹² Edmonton City Planning Department, West Jasper Place - Review Area. Outline Plan, Edmonton, 1967.

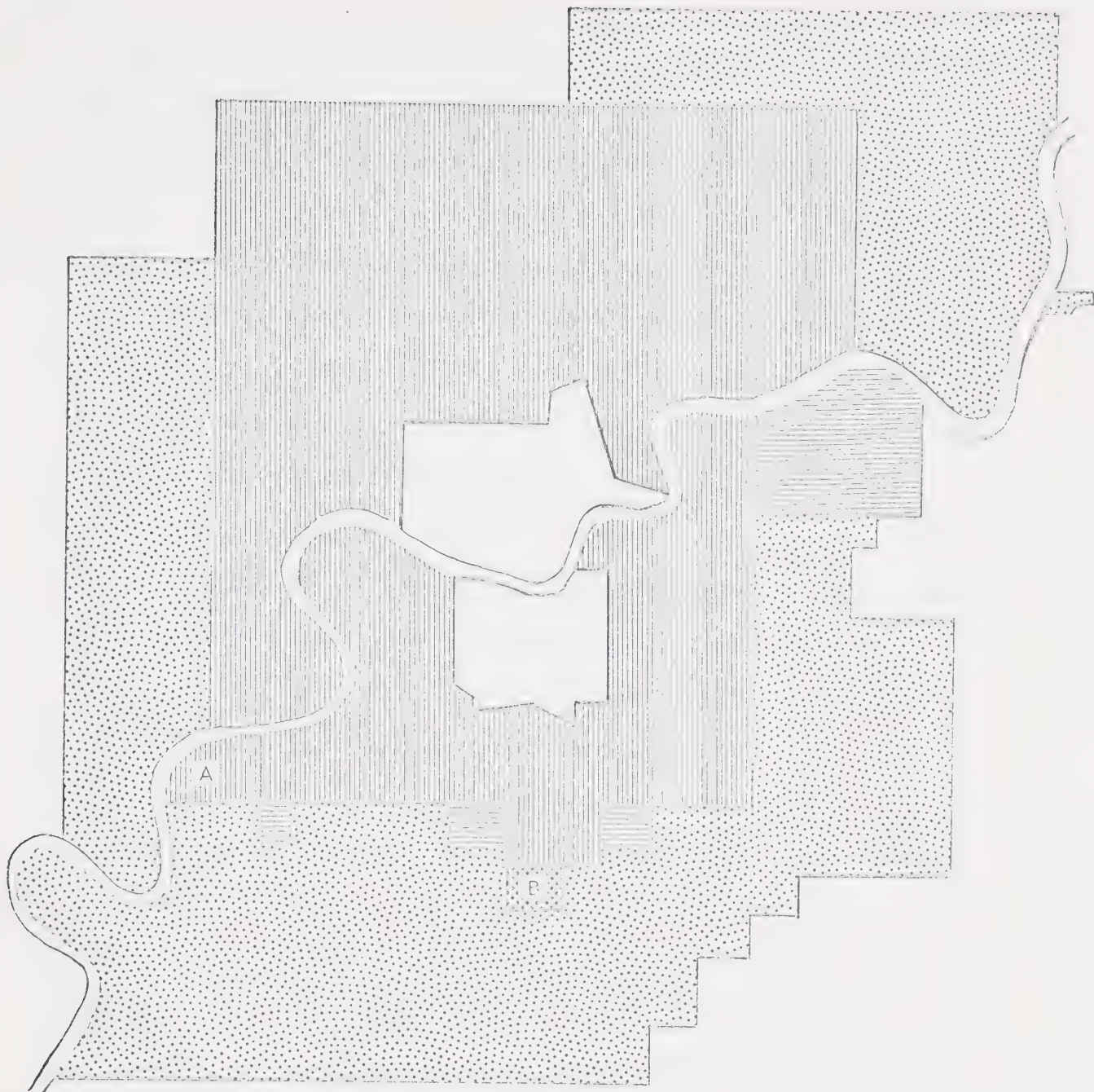


Fig. 16 City of Edmonton

ANNEXATIONS 1902 - 1968

Legend



City Area, 1902



Annexations, 1902 - 1914

A Area Released, 1915 - 1924 and reannexed 1958 - 1968



Annexation, 1915 - 1947

B Area Released, 1948 - 1957 and reannexed 1958 - 1968



Annexations, 1948 - 1957



Annexations, 1958 - 1968

Scale: 1" - 1.4 miles

Source: City Planning
Department

in the General Plan of the City of Edmonton,¹³ in order to reduce air and water pollution in the city.

During the last decade, the number of building permits has not considerably exceeded the figure for 1956, but the construction units have generally been bigger and the average value of the permits higher. However, in the tables, no account has been made for comparing money value, and therefore a great part of the increase only reflects higher salaries and general inflation, a fact which obstructs a comparison through a series of years.

In Table VI, a comparison is made between the value of the building permits in each category in per cent. No records are available for the time prior to 1950. Special records for value of apartment construction are kept from 1960 onwards. The average figures for the whole period per category point out the dominating role which residential building has played. Fifty per cent of the total value has gone into residential construction works. Up to 1958, the average figure was even higher than this; approximately 56 per cent, which illustrates the great demand for housing which occurred soon after the beginning of the oil boom. The construction value of apartments has described an uneven

¹³ The Province of Alberta Planning Act provides that a Municipal Council may prepare a general plan in which the manner of future development or re-development of the municipality may best be organized.

The Edmonton General Plan was published in August, 1967, and is a comprehensive document outlining the future growth of the City as determined by sound planning principles.

TABLE VI - CITY OF EDMONTON,
VALUE OF BUILDING PERMITS BY CATEGORY, IN PER CENT

Year	Commer- cial	Institu- tional	Residential Total	Apart- ments	Miscel- laneous	Total
1950	33	7	53	(-)*	7	100
1951	26	23	46	(-)	5	100
1952	2	37	58	(-)	3	100
1953	23	11	62	(-)	4	100
1954	22	15	58	(-)	5	100
1955	18	16	62	(-)	4	100
1956	33	14	50	(-)	3	100
1957	30	13	50	(-)	7	100
1958	8	22	66	(-)	4	100
1959	26	25	44	(-)	5	100
1960	27	30	38	(11)	5	100
1961	19	10	67	(23)	4	100
1962	23	28	46	(21)	3	100
1963	23	19	56	(22)	2	100
1964	32	24	42	(27)	2	100
1965	27	36	35	(19)	2	100
1966	18	50	30	(27)	2	100
1967	20	38	40	(45)	2	100
<u>Average</u>	23	23	50		4	100

Source: Building Permits - Architect's Department

* No figures available

but upward trend compared with other residential building, and in 1967 almost half of the total value was for apartments. This reflects a certain shortage of centrally-located land, with consequently high prices, and perhaps also a changing attitude towards living standards.

The values of building permits for both commercial and institutional construction have an average of 23 per cent for the whole period. The two categories have followed an irregular course with high leaps from one year to the other. The institutional value has been extremely high during the last three years of the period, which partly is a result of the extension of the University.

In this chapter an attempt has been made to give a brief, overall picture of the historical growth of Edmonton. In the historical review, special attention has been paid to that physical expansion of the city which takes place largely in the fringe zone bordering a built-up city area (Figures 5, 7, 10, 11, 12, 13, and 15). The next part of the study will deal exclusively with the rural-urban fringe zone which surrounds the Edmonton built-up area of 1968. Over great parts of that particular zone, urban development will spread in the near future.

CHAPTER II

DEFINITION AND DELINEATION OF THE RURAL - URBAN FRINGE ZONE

Before a discussion of the fringe zone characteristics is possible, the two basic terms "rural" and "urban" must be examined. The terms have customarily been looked upon as antonyms, with rural representing the open countryside with farmhouses and fields; with urban connoting busy streets, stores, industry, service facilities and dense population collected around a C.B.D. Until the beginning of the twentieth century, the differences between rural and urban ways of life were great, but with the development of public transportation and especially with the increasing use of privately owned cars, there has been a gradual blurring of the boundaries. When it was no longer necessary to live within walking distance of a place of work, many preferred to settle outside the city limits, where land was generally cheaper and the social environment more relaxed. As Leo Schnore points out:

The physical pattern of the large city and its surrounding area began to undergo crucial alterations. Decentralization, which had occurred first in only the largest cities, became a significant aspect of the growth of many smaller cities in the 1920s,

both industry and population were scattering as a response to the development of the motor vehicle. ¹

Even though the popular meaning of the terms rural and urban is still fairly clear, the terms themselves have taken on

overtones and added meanings whereby they come to refer to ways of life, cultural patterns, attitudes, value systems, etc. In this process of ideological transformation, the intangible aspects have tended to supersede the tangible as criteria of urban and rural attributes. The intangible aspects are of course quite real, but they are difficult to pin down in a census frame of reference, especially in view of the fact that all kinds of people live in both rural and urban areas. ²

In publications by the United States Bureau of the Census, the definitions of rural and urban population are arbitrarily based on number and density of people; very little is said about occupation and land use. For instance, according to their 1960 census definition, the urban population comprises all people living in

- (i) places of 2,500 inhabitants or more incorporated as cities, boroughs, villages, and towns;
- (ii) the densely settled urban fringe, whether incorporated or unincorporated, of urbanized areas;
- (iii) unincorporated places of 2,500 inhabitants or more. ³

The rural population is divided into "rural-farm" and

¹ L.F. Schnore, "Metropolitan Growth and Decentralization". Amer. Journ. Sociology, Vol. LXIII, September, 1957 p. 175

² United Nations, Data on Urban and Rural Population in Recent Censuses. New York, July, 1950, p. 1.

³ Bureaus of the Census, Statistical Abstracts of the United States. Washington D.C., 1968, p. 2.

"rural-nonfarm". The first group includes all persons living on farms and the second group the remainder.⁴

The Canadian Dominion Bureau of Statistics classifies as urban "all cities, towns and villages of 1,000 or more population, whether incorporated or not". In addition the "urbanized fringes of census metropolitan and other large urban areas, and the urbanized fringes of certain smaller cities where the city and fringe totalled 10,000 or more persons," are classified as urban. Like the American example, the remainder of the population is called rural, with a similar subdivision into farm- and non-farm families.⁵

The Canadian as well as the American census is based on number of people and density of settlement. Type of occupation is not taken into consideration. This causes statistical distortions. For instance, families who rent part of a farmhouse but get their income from non-agricultural pursuits will be included in the rural farm population. On the other hand, farm operators who do not live on their holdings, but in the nearest town or city, will be classed in the urban group, even if their total income is derived from agriculture.

Richard Dewey has recently made an interesting study concerning the use of the terms "rural" and "urban".⁶ He

⁴ Loc. cit.

⁵ Dominion Bureau of Statistics, Canada Yearbook 1968. Ottawa, 1968, p. 194.

⁶ R. Dewey, "The Rural-Urban Continuum: Real but Relatively Unimportant". Amer. Journ. Sociology, Vol. 66, July, 1960, pp. 60-66.

states that there is a general lack of agreement concerning the significance of the words, and that the divergence also is confined to writers with a central interest in rural-urban matters. A majority of writers vaguely relates the term "urban" to heterogeneity concerning land-use patterns, occupations and types and structures of commercial and industrial life, and conversely, "rural" is associated with a more homogeneous structure of the above-mentioned criteria. Dewey concludes his analysis with the following words:

It is clear that the terms "rural" and "urban" as now used and apparently understood, fall short of the standards to which they must conform if they are to be of value in teaching and research. If objective reference for the terms cannot be discovered, then it is reasonable to urge that they be abandoned. 7

Despite the fact that the meaning of the terms rural and urban nowadays is still vague, it is difficult to find other or more adequate terms. For the purpose of this thesis, "rural land use" must be understood to mean agriculture. Another term requiring definition is "farm unit". This is defined according to the Dominion Bureau of Statistics' 1966 definition, which is an "agricultural holding of one or more acres with sales of agricultural products of \$50 or more in the previous year".⁸ Use of these terms will be made in the analysis of the fringe zone characteristics of the City of Edmonton.

⁷ Ibid., p. 60.

⁸ Dominion Bureau of Statistics, op. cit., p. 194.

Terminology

It is also necessary to introduce and define here some of the terms which will be used in this thesis. First of all, the word "city" stands for the Corporate City, in other words the urban area within the city boundary, whereas "central city" is the Corporate City in relation to its umland. The term "urbanized area" includes the Corporate City as well as a zone of varying width outside the city boundaries within which urban development has taken place. In current literature there is considerable confusion of terminology concerning the rural-urban fringe zone. This term has been used almost interchangeably with terms such as urban fringe, rurban fringe, suburban fringe, urban sprawl, and commuting area. Consequently, a clarification is necessary.

As the term indicates, the rural-urban fringe zone is the entire area which surrounds an urban center, and which, by its nature, is neither strictly urban nor strictly rural, but a transitional area between the two. Generally, it is an area within which urban land uses expand at the expense of agricultural and related land uses. In order to avoid confusion, the word "zone" has been added to the term in this thesis, so that it indicates that the particular area is defined with regard to inner as well as to outer boundaries. The term "fringe zone" has been used interchangeably with the longer term, and is to be regarded as a full synonym.

Walter Firey introduced the term "rurban fringe" which

he uses for those areas located "immediately beyond" the built-up city.⁹ Rurban fringe, according to the definition, can be regarded synonymously with "rural-urban fringe". "Urban fringe", a term which, for instance, has been used in the United States Census, refers to the urbanized area minus the central city or cities.¹⁰

A suburb is a predominantly residential type of urban development located within commuting distance of a city, in which the main part of the suburban population is occupied. A satellite is a suburb which provides employment and is usually located further out from the central city than the suburb. "Suburban fringe" includes the belt of suburbs and interjacent rural land around the central city.

The term "urban sprawl" refers to the total visible expansion of the city into the countryside. Sprawl most often occurs along communication routes, thus leaving wedges of agricultural land in between the urban ribbons, a development which, for planning and aesthetic reasons, is undesirable. The fact that urban sprawl usually takes place outside the corporate limits of a city makes it impracticable to enforce city zoning and development regulations in the area. "Commuting area" is a term which can embrace all of the above-mentioned terms, since it takes in an area with an outer limit of thirty to forty-five miles for a considerable number

⁹ W. Firey, "Ecological Considerations in Planning for Rurban Fringes". Amer. Soc. Review, Vol. XI, No. 4, August, 1946, pp. 411-421.

¹⁰ Bureau of the Census, op. cit., p. 2.

of commuters.¹¹ Finally, the term "metropolitan area" can be applied to almost any city and be considered to include the city itself as well as the area it is presumed to dominate.

Basic Factors in the Definition of the Fringe Zone

It is easy to find literature dealing with rural and urban matters, but comparatively little has been done within the rural-urban fringe zone field. Yet these areas are of great significance for a number of reasons. Firstly, the fringe zone covers large areas outside any modern city, and provides space for living, work and recreation for a great number of people. Secondly, it is in this fringe zone that much new development takes place, and here as well as in the already built-up part of the city that new forms of living and modern ways of shaping the urban environment find their expressions. Therefore, the rural-urban fringe zone is of growing interest to various kinds of scientists, such as sociologists, economists, geographers, and city planners.

There are a number of factors which should be taken into consideration in order to present a useful definition of the rural-urban fringe zone. These factors are 1) location, 2) land characteristics, 3) growth and density, 4) occupation, 5) governmental structure, and 6) transitional character.¹²

¹¹ L.H. Russwurm, The Rural-Urban Fringe With Comparative References to London, Kitchener-Waterloo and Sarnia. Unpublished M.A. thesis, University of Western Ontario, 1961, p. 15.

¹² The discussion (pp. 37-40) is mainly a summary from R. Kurtz and J.B. Eicher, "Fringe and Suburb: A Confusion of Concepts". Social Forces, Vol. XXXVII, October, 1958, pp. 32-37, and L.H. Russwurm, op. cit., p. 16.

These factors are worthy of a brief discussion.

Location

According to most definitions, the rural-urban fringe is located outside the corporate city limits. If the densely built-up urban area extends beyond the city boundary, the fringe area usually is considered to start beyond this area. On the other hand, if the outer zone of the city has few urban characteristics, the inner boundary of the rural-urban fringe is drawn within the city limits, and in that case the fringe zone extends over incorporated urban as well as over rural land.

Land Characteristics

Typical of the fringe area is the heterogeneous land-use pattern. Much of the land is still in agricultural use, with farming units varying from big estates to small part-time farms. Interspersed among the farms are the residences of non-farm dwellers, a great number of them being former farmers who may have sold off their farm-land but have kept the farmhouses.

Close to the city former farmland is often converted for use as car-wrecking centers, which are noisy and obnoxious establishments. Along highways and roads ribbon development of a commercial and residential nature will often take place. According to Kurtz and Eicher, only areas with this inconsistent pattern of rural and urban land uses should be included in the rural-urban fringe zone and

if there are solid groups of residential homes without interspersion of farming units, or solid groups of farms without interspersion of non-farm dwellings, this area is not considered fringe area. 13

Growth and Density

The fringe zone is commonly defined as the most rapidly expanding part of the city. In many cities there is a great shortage of land in the central parts, and the expansion is bound to occur in the peripheral areas, which often coincide with the rural-urban fringe, and where land is still available at "reasonable" prices. New land for non-farm purposes is constantly being added, as farmers decide to sell their holdings or parts of them. Due to the great demand for land, land speculation is a common phenomenon in the fringe zones around cities, and in time the original owner of the land may be said to get a comparatively small share of the prevailing market price.

The population density of a city and its surrounding fringe zone decreases with increasing distance from the city center. Thus any rural-urban fringe zone should possess density ratios between those typical for the city and those for the genuine rural areas beyond the fringe's outer boundary.

Occupation

The rural-urban fringe represents an area of mixed rural and urban land uses. Consequently the occupation structure of the fringe population varies between typical

¹³ R. Kurtz and J.B. Eicher, op. cit., p. 35.

urban and rural occupations. Farming is, of course, the original income source in the area, but with the invasion of the city, many farms will be increasingly abandoned. In spite of low transportation costs and great demand for farm products by the city-dwellers, the fringe farmer considers it generally more profitable to sell his land for non-farm purposes than to carry on agriculture. The age structure of the fringe farmer is usually high, since young families with interest in farming seldom can afford to buy a farm in the vicinity of an expanding city. The occupation pattern of the farmers in the fringe area is also under the influence of the city, thus many specialize in growing highly-demanded products whereas others increase their income by part-time employment in the city industry or business. The main part of the new settlers in the fringe area derives its income from work in the city, and commute daily between home and place of work.

Governmental Structure

Most definitions confine the rural-urban fringe to an area which extends outwards from the corporate city boundary to an area which is of exclusively agricultural character. Consequently the fringe area is as such unincorporated, and governmental responsibilities may lie in the hands of local district or county politicians. In these unincorporated areas there is often a lack of urban facilities such as centralized sewage systems, street lights, and paved roads. Absence of these in turn makes taxes lower. Many new private enterprises are attracted to these unincorporated fringes,

due to lighter tax burdens and to fewer building and other restrictions.

Because of the relative absence of zoning regulations in unincorporated areas, the development often becomes haphazard. Gas stations, drive-in restaurants, trailer camps, car-wrecking centers are located side by side with motels and ordinary residences along major traffic arteries. Once established, they resist efforts to establish order and to set up restrictions against the spread of such kinds of unplanned development.

Certain parts of the fringe may be considered to fall within the incorporated limits of a town or city, if the area has some features which are more characteristic of the rural-urban fringe than of those of the city.

Transitional Character

The transitional and dynamic character of the rural-urban fringe has been pointed out above under the subsection "Land characteristics". Along the roads in the fringe areas, numerous "Land for Sale" signs for either industry or residences may indicate that the land is undergoing a rapid change from rural to urban uses.

The Rural-Urban Fringe: Various Definitions

Numerous sociologists have given their opinions on the definition and delimitation of the urban fringe and the rural-urban fringe zone. Below are a few pertinent points of view compared with those of the small number of geographers who have written on the topic.

Kurtz and Eicher's own definition gives a summary of the fringe zone characteristics described above. They omit the "transitional character" factor which was added by Russwurm, a geographer. They state that it has a

location beyond the limits of the legal city, in the 'agricultural hinterland', exhibiting characteristics of mixed land use, with no consistent pattern of farm and nonfarm dwellings. The residents are involved in rural and urban occupations. The area is unincorporated, relatively lax zoning regulations exist, and few, if any, municipal services are provided. The area shows potentialities for population growth and increasing density ratios. Present density ratios are intermediate between urban and rural. ¹⁴

In summary, Walter Firey describes the rural-urban fringe zone as an area occupied by tar paper shacks and stately estates, large commercial farms and one-acre part-time farms, golf courses and cemeteries, air ports and obnoxious industries. Blocks of subdivided lots lined with sidewalks and dwellings exist side by side with numerous vestigial commercial farms. Great expanses of land grown to weeds, well tended country estates owned by corporations and city business men - all distributed in clusters and ribbon development - exist in this area. ¹⁵

According to these descriptions, the rural-urban fringe zone is to be considered more as an area where the rural land-use pattern begins to be affected directly by the urban

¹⁴ R. Kurtz and J.B. Eicher, op. cit., p. 36.

¹⁵ W. Firey, op. cit., pp. 411-421.

economy through the introduction of major land uses which are not strictly rural, in contrast to its being the most rapidly growing part of the city. On the other hand, Firey stresses the heterogeneous land-use pattern and the transitional character of the fringe zone. His definition does not emphasize location, density, occupation, or governmental structure.

Martin defines the rural-urban fringe zone as "the area of interpenetrating rural and urban land uses peripheral to the modern city". According to Martin, this area is "the most rapidly growing area of residence" with a "dynamic population mass seeking to adjust to a habitat that is rural yet urban, by techniques which are neither rural nor urban".¹⁶ In his study, Martin discusses all the above-mentioned basic definition factors, even though the heterogeneous land-use pattern is stressed in particular in the definition. However, later in his study, the author somewhat detracts from his earlier definition by describing the zone as an area of "older and well-established neighbourhoods with considerable community spirit, mingling with solid blocks of new, jerry-built homes".¹⁷

There are also several other broad and perhaps useless definitions given. Arpke, for instance, defines the fringe zone as "the cultural development which takes place outside

¹⁶ W. T. Martin, "The Rural-Urban Fringe: A Study of Adjustment to Residence Location". Studies in Sociology, No. 1, University of Oregon, Eugene, Oregon, November, 1953, p. iii.

¹⁷ Ibid., p. 19.

the political boundaries of central cities and extends to the area of predominantly agricultural activity".¹⁸ The term "cultural development" is not further discussed, but it is obvious that the author considers most of the development in the fringe as a result of city growth and urban economic expansion. According to Arpke's definition, the urban fringe is a large zone surrounding the city, and encompassing the general rural-urban fringe zone as well as the suburbs located in the fringe area.¹⁹ Only the three factors location, land characteristics, and transitional character, are underlined in his definition.

One other such definition is presented by Jaco and Belknap. "The fringe herein considered includes suburbs, satellite cities, and any other territory located immediately outside central cities whose labor force is engaged in non-farm activities."²⁰ Such definitions possess little value, and often cause confusion since they take in a very big area. Furthermore, the term "central cities" is not explained.

On the sociological significance of the rural-urban fringe, Charles Lively questions whether the terms "rural" and "urban" really are useful in describing the development

¹⁸ F. Arpke, "Land Use Control in the Urban Fringe of Portland, Oregon". Journ. Land and Public Utility Economics, Vol. XVIII, No. 4, November, 1942, p. 468.

¹⁹ Notable is the difference between Arpke's rural fringe definition and that of the United States Census on p. 35.

²⁰ E.G. Jaco and I. Belknap, "Is a New Family Form Emerging in the Urban Fringe?". Amer. Soc. Review, Vol. 18, October, 1953, p. 551.

which takes place in the fringe zone. Three principles were formulated by him, of which the first two represent a summary of more common fringe definitions, whereas the third stresses the more specific nature of the rural-urban fringe. Lively's fringe criteria are as follows:

1) The rural-urban fringe represents a spatial position on a rural-urban distribution.

2) The rural-urban fringe represents an overlapping of two distinct distributions - the rural and the urban - providing a scrambled confusion within the area of overlap.

3) The rural-urban fringe represents a third distribution with some characteristics of both the rural and the urban, but with some new ones found only in the "fringe".²¹

The writers who have been cited above are all sociologists, and it is in sociological publications that most articles dealing with the rural-urban fringe zone are to be found. There are comparatively few geographers who have written about the development of the fringe area. Johnson has made an analysis of the land-use pattern around the modern city in his book Urban Geography, and he points out the absence of "a clear break between rural and urban conditions measured both in terms of land use and of social organization".²² No distinct definition of the rural-urban fringe is given, but the heterogeneous character of the fringe zone

²¹ C.E. Lively, Introduction to "The Sociological Significance of the Rural-Urban Fringe". Rural Sociology, Vol. 18, 1953, p. 101.

²² J.H. Johnson, Urban Geography, An Introductory Analysis. Pergamon Press, Oxford, 1967, p. 142.

is stressed and the author says that there is very often an underestimation of the "degree to which urban influences prevail in the environs of a large city" since "some of the land uses may give a false impression of rurality as where a village has become the home of a community of commuters".²³

Another geographer, Lorne Henry Russwurm, has given a detailed definition of the rural-urban fringe, after first having discussed a number of definitions from old as well as recent publications. Russwurm's definition coincides to some extent, with Kurtz and Eicher's with respect to fringe criteria. Russwurm stresses especially the transitional character of the fringe zone. It is described as an area which is "undergoing transition from an almost exclusively rural to an urban land use pattern, and which has potential for future growth because open land is available and because rising land values urge farmers to sell".²⁴ The whole definition reads as follows:

The rural-urban fringe is thus the unincorporated zone of mixed rural and urban land uses, undergoing transition from rural to urban land uses, outside the corporate city limits and its contiguous built-up suburbs wherein population densities are lower than urban but higher than rural, and wherein over 50 per cent of the working population is engaged in non-farm occupations. ²⁵

Even though the transitional nature of the fringe zone is pointed out by Russwurm, his definition takes in as well unincorporated dormitory villages and rural hamlets which

²³ L.H. Russwurm, op. cit., p. 23

²⁴ Loc. cit.

²⁵ Loc. cit.

show an increasing urban character. The writer justifies his decision to include such islands of urban settlement in the rural-urban fringe zone, since politically they are under a municipal administration, whose major administrative region is more rural than urban.

The definition of the rural-urban fringe zone of Edmonton will be formulated in the light of these varying criteria for the delimitation of a rural-urban fringe zone.

The Rural-Urban Fringe: Problems of Delimitation

In the attempt to obtain information concerning rural-urban fringe zone characteristics to apply to Edmonton, some different books or articles were consulted. The majority of studies has not been concerned, however, with the delimitation problem. Not even the Canadian Bureau of Statistics sets any useful basis on how the areas termed "urbanized fringes" should be delimited.²⁶

A delineation of the rural-urban fringe zone can be based upon only two broad methods - 1) statistical data, and 2) subjective judgements. Both methods have limitations; statistical data are usually collected for a whole civil division, and social and cultural and economic changes coincide only exceptionally with these large units. Subjective judgements, on the other hand, invite disagreement and are considered as acceptable only if the final judgement has been agreed upon by a majority of observers. Statistical data have been used by Myers and Beegle in a study in which

²⁶ Dominion Bureau of Statistics, op. cit., p. 194.

the rural-urban fringe of Detroit is delineated and analyzed.²⁷ This report is frequently referred to by other investigators,²⁸ since it describes a simple and still reliable method by which to delineate the fringe.

These two authors base their delimitation of the fringe upon two principal elements: 1) the use of minor civil division units, and 2) the use of a derived population category, the Non-Village, Rural-NonFarm population. The NV-RNF category can easily be derived from census material, and can be said to be true representatives of the fringe people. Since the latter live in areas immediately outside the city boundaries, they do not make their living from the land, and they do not live in organized villages. The majority of them are urban workers who live on the land of unworked farms.

Myers and Beegle use the township as the civil unit for their investigations, since the township is the smallest territorial unit for which data are available in the Detroit area. They assume that the significant fringe township has 50 per cent or more of its population in the NV-RNF category. A township which has less than 50 per cent, but more than 25 per cent of its people in the NV-RNF class is referred to as a partial fringe township, since it can be considered to move in the direction of a numerically balanced fringe town-

²⁷ R.R. Myers and J.A. Beegle, "Delineation and Analysis of the Rural-Urban Fringe". Applied Anthropology, Vol. VI, Spring, 1947, pp. 14-22.

²⁸ Examples are R.E. Murphy, The American City - An Urban Geography. McGraw-Hill Book Co., New York, 1966, p. 43; and L.H. Russwurm, op. cit., p. 26.

ship within a short period of time. The legal limits of the central city are used as the inner boundary of the fringe.

By using the above-described delineation method it is possible to get a general approximation of the fringe area, but for most purposes the township may be too large a unit to use, especially for smaller cities.

Other writers most frequently base statistical delineation methods on density. Thus the Lower Mainland Regional Planning Board of the Vancouver region used a population density of 0.3 persons per acre for the outer boundary of the rural-urban fringe and 3.5 persons per acre as the inner one.²⁹ Martin in his Springfield-Eugene study used a different delineation method. He used a map on which the location of all single-family residences was shown. From the same map it was relatively easy to point out where the characteristic heterogeneous land use of the fringe area changed to a dispersed pattern of farms, which marked the outer boundary of the fringe zone. When the fringe area was delineated, a sampling procedure followed with a quarter-section as the adopted primary sampling unit.³⁰

Finally there is the study of Blizzard and Andersson, in which personal observations form the basis for the delineation of the fringe zone. The place for the study is

²⁹ Lower Mainland Regional Planning Board, Urban Sprawl, April 1956, p. 3.

³⁰ W. Martin, op. cit., p. 30.

Williamsport, Pennsylvania, a city of 45,000 people.³¹ A general highway map of the county of Lycoming was used in the process. Reconnaissance trips were made outward from the city on all roads, and the points at which agricultural land uses began to predominate were marked and the limits of axial growth thus established. Areas located between the highways were inspected, and inspection was also carried out beyond the boundary to make sure no concentrations occurred farther out.

The outer boundary of the fringe was thus established where the urban pattern of settlement became a pattern of scattered acreage lots with non-farm type housing among farms or pure farming and forest land use. The inner boundary of the fringe was determined by the completeness or lack of completeness of city services available, with the corporate boundary of the city taken as the ruling base line. In areas within the city where few city services were available, the fringe zone boundary was retracted over the city boundary.

Although the above-described method is time consuming and the decisions made are subjective, its validity can be high, providing the observations are thorough and consistent.

The Rural-Urban Fringe Zone of Edmonton

Definition and Delimitation

In determining the extent of the rural-urban fringe

³¹ S.W. Blizzard and W. Anderson, "Problems in Rural-Urban Fringe Research: Conceptualization and Delineation". Progress Report No. 89, Pennsylvania State College Agricultural Experiment Station, 1952, pp. 19-22.

zone of Edmonton, Blizzard and Anderson's definition was used in part. Thus this author's definition reads: the rural-urban fringe zone is an area of mixed rural and urban land uses undergoing transition from rural to urban character, extending from the edge of the contiguously built-up urban area to an area in which agricultural land uses predominate. (Blizzard and Anderson's delimitation reads:

The rural-urban fringe is that area of mixed urban and rural land uses between the point where full city services cease to be available and the point where agricultural land uses predominate (which includes waste land and wooded areas). 32)

The rural-urban fringe zone is thus located beyond the contiguously built-up urban area, and may include incorporated as well as unincorporated areas. The land use of the fringe zone is of heterogeneous rural and urban character, from which it follows that the area also has a heterogeneous occupation structure. Since the delimiting factor for the inner boundary of the fringe zone is the contiguity of the urban development, the settlement density, and consequently the population density of the fringe zone are for obvious reasons lower than those of the genuine rural areas which lie outside the rural-urban fringe zone. The most rapid rates of transition from rural to urban land uses occur in the immediate proximity of the edge of the contiguously built-up urban area, most assuredly in that particular part of the fringe zone which is located within the boundaries of the

³² S.W. Blizzard and W. Anderson, op. cit., p. 143.

incorporated city, because urban facilities of different kinds are generally provided there.

In the case of the City of Edmonton both the inner and outer boundaries of the rural-urban fringe zone were relatively easy to delineate, chiefly from aerial photos for 1967. A close field survey by car was undertaken by the writer as well, in order to decide upon the extent of recent development and change. According to the above definition, the inner boundary of the fringe zone has been drawn along the edge of the contiguously built-up urban area, without consideration taken as to whether the particular area is incorporated or not (Fig. 17). The zone of mixed rural and urban land uses around the City of Edmonton is comparatively limited, and has nowhere been considered to extend further out than four miles from the strictly urban boundary. The outer boundary of separation for the rural-urban fringe zone follows section and quarter-section lines where land uses of an agricultural character seem exclusive of other activities. The suburbs which are located outside the corporate limits of the City have not been included in the fringe zone, since there is a substantial area of improved agricultural land between them and the area of transition.

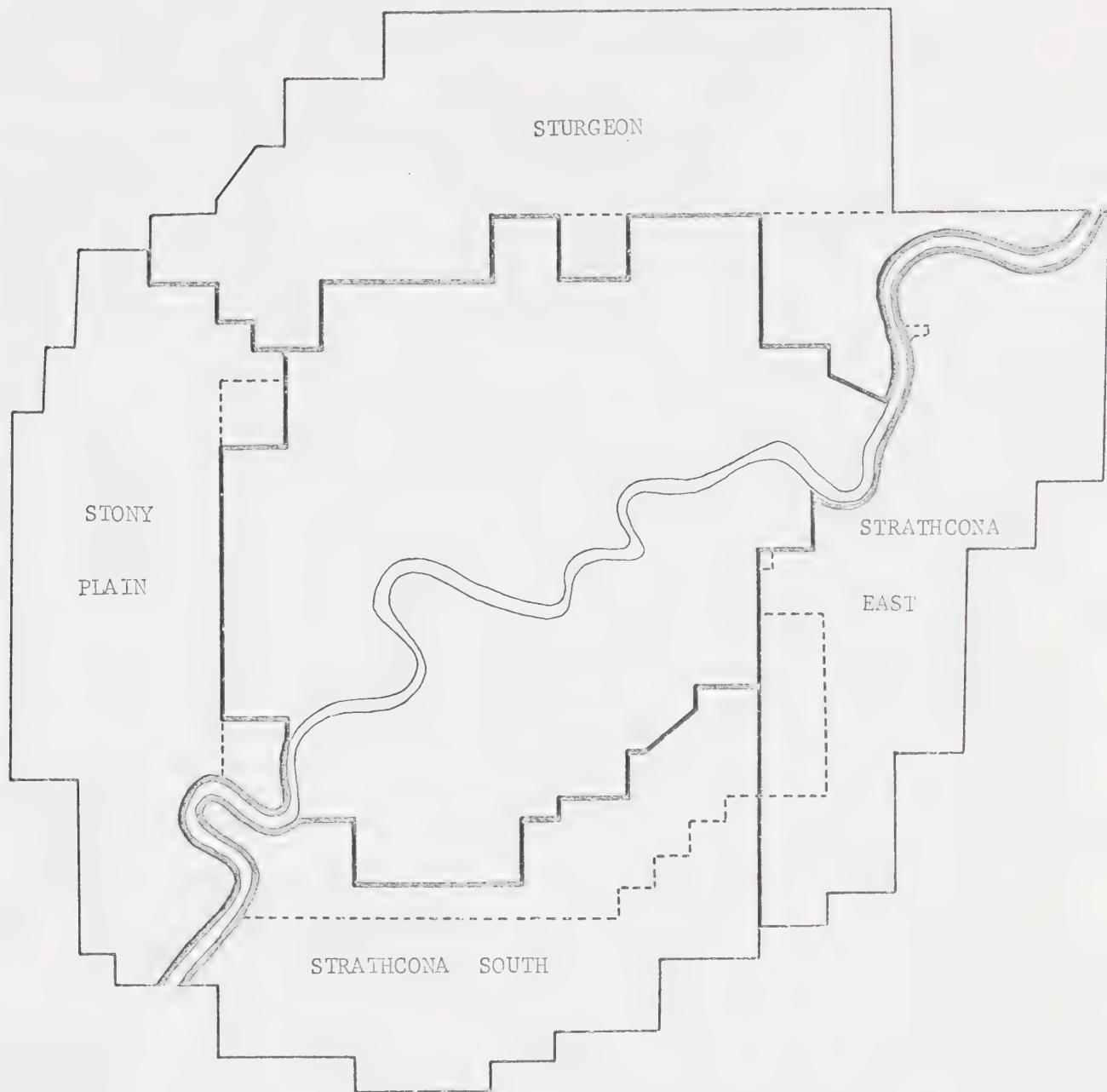


Fig. 17 The Rural - Urban Fringe Zone of Edmonton
THE FOUR FRINGE ZONE SUB - AREAS

----- City Boundary

Scale: 1" - 2.3 miles

CHAPTER III

THE RURAL - URBAN FRINGE ZONE OF EDMONTON

Site Characteristics of the Edmonton Region

The present topographic features of the Edmonton City area reflect its past geological origin. The whole area is underlain by the Edmonton Formation of the Upper Cretaceous Age. This consists of sandstone and shales, with some seams of coal. The strata of the formation dip very slightly to the southwest at a rate of 20 feet per mile. During the Wisconsin glacial phase, the area was covered by a continental glacier with a maximum thickness of approximately 1 mile. The retreat of the glacier from central Alberta was largely by stagnation. The meltwaters which were impounded in front of the ice sheet produced large lakes, many hundreds of square miles in area. The lakes became rather short-lived since the rapid recession of the glacier allowed these lakes to find constantly new and lower outlets.

The Edmonton Area was at one time completely covered by one such glacial lake - Lake Edmonton which, when drained by way of the North Saskatchewan River in post-glacial time, left a flat layer of lacustrine sediments. Immediately after the final drainage of Lake Edmonton, the River flowed as a braided stream. Later one of the channels was incised to become the present-day northeast flowing North Saskatchewan River. Today's river valley varies in width between one-half and one mile. Within the present site of the City, the valley averages about 160 feet in depth, and approaches in

certain places 200 feet.¹

The upper part of the sides of the valley offer excellent building sites, but the River has, in its meandering course through the City, undercut many of these bluffs, and every year land-slips cause damage to property along the river valley. There is a marked seasonal fluctuation in flow of the North Saskatchewan River. The average monthly flow ranges from a low of 1,120 c.f.s. in February to a high of 20,510 c.f.s. in July. This represents a variation of over 8 feet in height. One of the most damaging floods occurred in June, 1915, when the water level rose 45.0 feet and covered the entire floor of the river valley.² This flood caused a number of firms and private residents to relocate at safer areas on the top of the valley sides.

A slough-dotted upland surface which previously was the flat bed of the extensive Lake Edmonton, was originally drained by several ravines. Today, Whitemud Creek in the southwest is the only ravine which is water bearing all year round.

According to the climate classification system designed by W. Koeppen, the Edmonton region lies in the cool temperate zone, with a summer of four months when the mean temperature is 50°F. or over. The coldest month has a mean under

¹ The description in this paragraph is summarized mainly from L.A. Bayrock and G.M. Hughes, "Superficial Geology of the Edmonton District, Alberta". Preliminary Report 62-6, Research Council of Alberta, Edmonton, 1962.

² W.C. Wonders, "River Valley City: Edmonton on the North Saskatchewan". Cdn. Geogr., No. 14, 1959, p. 9.

26.6°F.³ In the City of Edmonton the annual mean temperature has been 56°F. between May and September, the figure being based on long-term records from 1881. July is the warmest month averaging 62°F. The mean winter temperature, November to March inclusive, is 16°F., with January the coldest month averaging 6°F. The frost-free period varies considerably from year to year, but on the average, consists of about 100 days. The last spring frost usually occurs in the last week of May and the average date of the first fall frost is in the first week of September. The growing season comprises about 175 days.⁴

The mean annual precipitation is around 18 inches, and the months of highest rainfall are June, July and August. Locally there is a marked deficit of water during spring and early summer, mainly due to the varying water storage capacity of the different soil types.

The principal air masses which affect central Alberta in winter are the Continental Arctic air, which has its origin in northern Canada and Alaska, and the Maritime Polar air, the origin of which is over the central Pacific Ocean. Along the frontal zones between these two air masses, cyclonic activity frequently develops and moves southeastwards or eastwards. In summer there is an intense subtropical high

³ The paragraphs which deal with climate are mainly from W.G. Kendrew and B.W. Currie, The Climate of Central Canada. Queen's Printer, Ottawa, 1955.

⁴ Pers. comm. R.W. Longley, University of Alberta, Edmonton.

pressure system over the North Pacific Ocean, and a low pressure system over the western United States, which two systems give central Alberta northwesterly and southeasterly winds. With the latter, moist and warm air is brought in from the Great Plains area. This air gives central Alberta most of its precipitation in the summer, sometimes with hail or thunderstorms. The prevailing wind direction during the year in the area is from the northwest. The average wind speed is about 10 miles per hour with variations throughout the year.

The soils of the Edmonton area range from non-arable land to excellent arable land.⁵ Nearly 70 per cent of the area is fairly good arable land or better. Few farms in the Edmonton area have been cultivated for more than 75 years, but still analyses indicate that there is already a substantial loss of fertility locally. Several hundreds of acres have also been permanently removed from agriculture during the last 20 years as a result of the rapid growth of the City.

Chernozemic soils predominate in the area and are, in general, good to excellent arable lands. Throughout the chernozemic soil areas, smaller patches of solonetzic soils occur, the latter possessing lower fertility than the chernozemic soils. In the rural-urban fringe zone, areas with solonetzic soils are found south and east of the City. Their lower value for farming purposes is indicated by the fact

⁵ Summary from W.E. Bowser et al, Soil Survey of Edmonton Sheet (83-H). Alberta Soil Survey Report No. 21, University of Alberta Bulletin No. SS-4, 1962.

that industrial development has to a great extent been allowed to take place on these soil types. Smaller patches of solonchaks soils also occur in the Sturgeon fringe sub-area. In the district west and northwest of the City, several shallow lakes and sloughs remain as evidence of the former glaciation. The surrounding soils are poorly drained and have limited agricultural use. Soils which have developed in the presence of a high or highly-fluctuating water table usually become gleysolic, a type of soil which would be good for farming if proper drainage was provided. In the northeast, along the North Saskatchewan River, the overburden of soils over the preglacial deposits is very thin and consequently the land is not suitable for farming. The sand and gravel have been mined successfully in those areas. The quality of the soils in the region as a whole has not had any marked influence on determining whether the land would have been used for urban or rural purposes.

Today the natural tree vegetation of the Edmonton area is sparse, with the exceptions of the River Valley and White-mud Creek. Patches of dense tree cover also are found in the West Jasper Place area. Brush vegetation dominates in the other forested areas (Fig. 22 a-d). Significant local vegetation contrasts in the River Valley have been noted by W.C. Wonders.⁶ He states that there is a clear difference between north- and south-facing slopes, due to the shade and

⁶ W.C. Wonders, "River Valley City - Edmonton on the North Saskatchewan". op. cit., p. 10.

moisture factor. Thus the north-facing slopes are predominantly forested with aspen, white spruce and poplar, whereas grasses and bush-like vegetation dominate on the south-facing slopes. Because of man's influence over the centuries, and because of pyric influences that would have been accentuated by his presence, most of this vegetation is secondary growth or more likely a substage in the evolution towards a climatic climax for the region.

Presentation of the Study Area

The City of Edmonton is surrounded by the Municipal Districts of Stony Plain in the west and Sturgeon in the north. In the east and south, the City is bounded by the County of Strathcona. The North Saskatchewan River forms the border between the County of Strathcona and the Municipal District of Stony Plain in the southwest and between the County of Strathcona and the Municipal District of Sturgeon in the northeast (Fig. 17). In this study, these different areas will be treated separately and referred to as Strathcona East, Strathcona South, Stony Plain and Sturgeon. Portions of the City varying in size are included in one or other of these districts.

The whole study area comprises 500 quarter-sections, 125 square miles. Sturgeon is the largest sub-area, with 160 quarter-sections (40 square miles), followed by Stony Plain (119 quarter-sections, 30 square miles), Strathcona East (111 quarter-sections, 28 square miles), and Strathcona South (110 quarter-sections, 28 square miles).

The rural-urban fringe zone of the City of Edmonton has a comparatively limited extent so far. According to the definition in Chapter II, the fringe zone starts immediately beyond the edge of the contiguously built-up area. In the case of Edmonton, the zone of mixture of rural and urban land-uses which is typical of the fringe, often occurs within the City's corporate boundaries. In some instances a considerable portion of the City should be included in the fringe zone (Fig. 17).

The delineation method used in this study is subjective and as such, subject to criticism and question. "The edge of the contiguously built-up area" is a loose concept, but for the City of Edmonton that area is relatively easy to recognize and delineate, because the urban development in the built-up area is comparatively dense and stands in distinct contrast to the dispersed development (Fig. 22a-d), which is typical of the rural-urban fringe zone of the city. The definition used for this study would eventually be difficult to apply on a study of another city with a different settlement pattern and economic structure.

For most parts of the rural-urban fringe zone of Edmonton, the inner boundary by chance follows the outskirts of residential areas, but the term "built-up area" naturally refers to all kinds of urban development. In some instances, quarter-sections with dominating industrial and commercial land uses form the outer part of the built-up area.

The outer boundaries of the fringe zone have been drawn

where the heterogeneous land uses merge into the more obvious agricultural type of settlement and land use. Some residential subdivisions occur in the outer part of the fringe zone, but these quarter-sections can still be accepted as forming the outer edge of the fringe zone, since they are surrounded by agricultural lands on all sides (Fig. 22a-d).

Population Density in the Rural-Urban Fringe Zone

Most rural-urban fringe zone studies deal with density patterns,⁷ and many delineations of the fringe areas are based strictly upon population and settlement density. In the case of Edmonton's rural-urban fringe zone, the inner boundary will be determined by the density of the settlement, whereas the outer fringe zone boundary is to be based upon land-use characteristics. The population density of the rural-urban fringe zone of Edmonton is then assumed to be

- 1) a value somewhere between the respective density for the City and that for the genuine rural area, and
- 2) higher close to the "contiguously built-up area" and lower with increasing distance from this area.

The above assumptions were tested after the delineation of the fringe zone was completed. The Land Use Map (Fig. 22a-d) of the rural-urban fringe zone was utilized as a base map for the investigations. In order to obtain regular and

⁷ Examples include the Canadian and United States Census Bureau definitions since 1950 (1951); and also W. Martin, "The Rural-Urban Fringe: A Study of Adjustment to Residence Location". Studies in Sociology No. 1, University of Oregon Press, Eugene, Oregon, 1953, p. 30; and Lower Mainland Regional Planning Board, Urban Sprawl. April, 1956, p. 3.

comparable units, the quarter-section lines were used as a grid net,⁸ and the population calculations were based on settlement density within each square. Each settlement unit, farm or non-farm residence, was assumed to contain four people as an average.⁹

There are quite a number of institutions, such as the Alberta Hospital (Oliver) and the Redeemer College, located in the rural-urban fringe zone, and the quarter-sections within which these types of institutions are situated have automatically been grouped in the highest density class. The same situation occurs with trailer camps.

With reference to the obtained density pattern, three classes of population densities could be distinguished.

- 1) 17 persons or more per quarter-section,
- 2) 9 - 16 persons per quarter-section, and
- 3) eight persons or less per quarter-section.

The population density map (Figures 18a-d) shows an uneven distribution marked by population clusters. Generally, the highest concentrations occur within a one mile wide zone extending outwards from the inner boundary of the fringe zone.

⁸ A quarter-section is made up of 160 acres and each square has a side of half a mile. Four quarter-sections or 1 square mile contain 640 acres.

⁹ According to the Census statistics of Canada in 1966, the average size of a household in the Census Metropolitan Area of Edmonton was 3.8 persons. The average number of children 24 years and under per family was in the same year 1.9 in the total census metropolitan area of Edmonton. The City proper accounted for 1.8 children per family and the rest of the metropolitan area had 2.5 per family. The figures indicate that the population of the rural-urban fringe zone as well as of the rest of the metropolitan area probably is younger than that of the City proper, and that the families are bigger. The figure for the average size of a family has here been rounded off to 4.

The parts of the fringe zone which are located within the corporate City limits, as may be expected, have a comparatively higher population density than the rest of the fringe zone.

In Table VII a comparison between the four fringe zone sub-areas has been made with regard to population density per quarter-section.

TABLE VII - DISTRIBUTION OF GROUPED POPULATION DENSITY PER QUARTER-SECTION AND SUB-AREA

Density Class		Strathcona East		Strathcona South		Stony Plain		Sturgeon	
Persons/ Sq. Mi.		No./Qs	%	No./Qs	%	No./Qs.	%	No/Qs	%
Group 1	>17	9	8	11	10	13	11	19	12
Group 2	9-16	3	3	5	5	12	10	19	12
Group 3	<9	99	89	94	85	94	79	122	76
Total		111	100	110	100	119	100	160	100

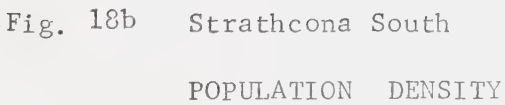
The number of quarter-sections within each of the three groups is similarly distributed throughout the four parts of the study area, with over 80 per cent of the total number of quarter-sections falling in the lowest density group. Lesser variations occur in the different areas. Strathcona East has the fewest quarter-sections in the two highest density groups, only 11 per cent. The high density area largely coincides with the developed ribbons along Highway 14 (Fig.




18a and 22a). A very high percentage of the population (89 per cent) in Strathcona East lives in low density farm, or non-farm residences. This is typical of the whole fringe sub-area.

Strathcona South has a more irregular density pattern than Strathcona East. It has a number of scattered residential subdivisions (Figures 18b and 22b) which fall in the high density group.¹⁰ High concentrations of residential-institutional developments occur immediately south of the inner fringe boundary and along the river in the southwest. Still 85 per cent of the quarter-sections belongs within the lowest density group.

Ribbon development with relatively high population density has taken place in the west along Highway 16 in the Stony Plain sub-area (Figures 18c and 22c), where otherwise 79 per cent of the quarter-sections have the lowest density in this sub-area. The higher density areas are scattered here too, except for the high density development along the highway. Sturgeon in the north, compared with the three other sub-areas, has the highest number of quarter-sections in density groups 1 and 2 (12 per cent each). The population clusters are found close to the inner fringe boundary and along the major communication routes (Figures 18d and 22d). The Alberta Hospital (Oliver), located in the extreme northeastern part of the Sturgeon area, aids in

¹⁰ A subdivision is a discrete area which has been surveyed for a particular urban function such as residential, commercial or industrial.



	17 persons or more / quarter section
	9 - 16 persons / quarter section
	8 persons or less / quarter section

Scale: 1" - 1.5 miles

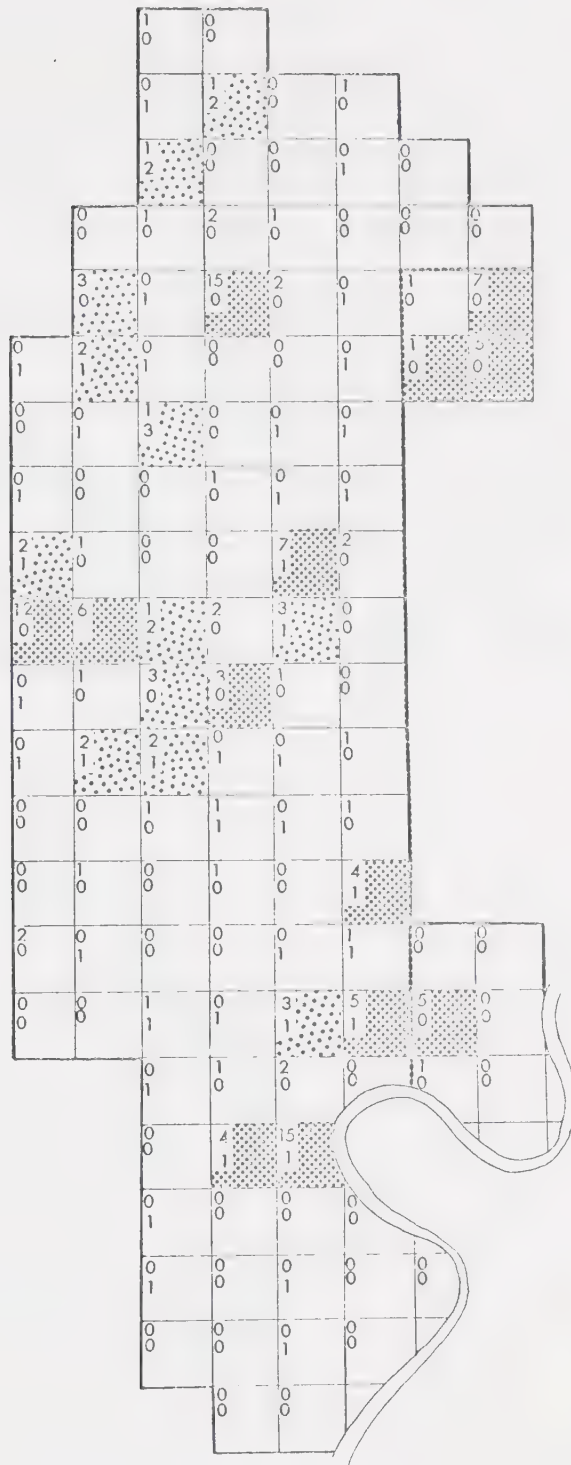





Fig. 18c . Stony Plain

POPULATION DENSITY

Legend:

-  17 persons or more / quarter section
-  9 - 16 persons / quarter section
-  8 persons or less / quarter section

($\frac{0}{1}$ - $\frac{\text{non-farm}}{\text{farm}}$ residences)

----- City Boundary

Scale: 1" - 1.5 miles

increasing the general density pattern.

Next, investigation was made in order to establish an approximation of the number of and the ratio between non-farm and farm dwellers in the rural-urban fringe zone. The total number of non-farm and farm residences was counted and the resulting figure multiplied by four, the approximate number of members per household (See page 61). Non-farm residents do not include residents of hospitals or other institutions. Neither were trailer camps nor motels considered because of the temporary nature of that type of occupancy.

In this density study, the number of non-farm and farm residences was kept apart and noted in each quarter-section in the form of an index, $\frac{r}{f}$, in which "r" represents the number of non-farm residents and "f" the number of farm residences (Figures 18 a-d).

Table VIII shows the total number of residences and the size of the population in the respective category in each of four fringe sub-areas. It shows that there is a total number of 551 non-farm residences and 230 farm residences in the fringe zone. These 781 dwelling units, therefore, provide accommodation for a total of 3,124 persons. In the study of the size of population, each residence has been assumed to accommodate only one family, and no attention has been paid to the cases in which part of the dwelling house has been sub-rented to another family. Therefore, the calculated population figure is probably too low, but will serve for comparative purposes.

TABLE VIII - TOTAL NUMBER*OF NON-FARM AND FARM RESIDENCES
AND THE SIZE OF THE POPULATION IN THE RURAL-URBAN
FRINGE ZONE

Area	Non-farm No. Res. (r)	Non-farm Pop. Res. (4r)	Farm Res. (f)	Farm Pop. (4f)	Total No. Res.	Total Pop.
Strathcona East	88	352	58	232	146	584
Strathcona South	131	524	40	160	171	684
Stony Plain	143	572	47	188	190	760
Sturgeon	189	756	85	340	274	1096
Total	551	2204	230	920	781	3124

No. Res. - Number of Residences Res. - Residences
No. - Number
Pop. - Population

Table IX illustrates the population density in each of the four sub-areas of the rural-urban fringe zone.

TABLE IX - POPULATION DENSITY* BY FRINGE ZONE AND
SUB-AREA

Area	Number of Quarter- Sections	Total Population	Persons/ Quarter- Section	Persons/ Square Mile
Strathcona East	111	584	5.3	21
Strathcona South	110	684	6.2	25
Stony Plain	119	760	6.4	26
Sturgeon	160	1096	6.9	28
Total	500	3124	6.2	25

* The figures are estimated

Sturgeon has the highest population density with 28 persons per square mile, closely followed by Stony Plain and Strathcona South, with 26 and 25 persons per square mile respectively. Strathcona East has a smaller average population per square mile, 21 persons. This is due to the fact that much of the land area is already occupied with industrial development. The entire rural-urban fringe zone has an average population of 25 persons per square mile.

Table X illustrates the density ratio between non-farm and farm residences.

TABLE X - THE RATIO BETWEEN NON-FARM AND FARM RESIDENCES
IN THE RURAL-URBAN FRINGE ZONE

Area	Number of Non-farm Residences (r)	Number of Farm Residences (f)	Ratio ($\frac{r}{f}$)
Strathcona East	88	58	1.5
Strathcona South	131	40	3.3
Stony Plain	143	47	3.0
Sturgeon	189	85	2.2
Total	551	230	2.4

There is more than twice as many non-farm residences as farm residences in the whole zone. The number of farms, and also the size of each individual farm, increases with the distance from the city. Still it is interesting to note

that there is a large number of farms located within half a mile from the inner boundary of the fringe. Actually, many of these farms are situated within the corporate city boundary.

Strathcona South and Stony Plain are the two most urbanized sub-areas of the rural-urban fringe zone, with respect to ratio of non-farm to farm population. In these two areas there are 3.3 and 3.0 times respectively as many non-farm as farm residences. Sturgeon has a ratio of 2.2 and Strathcona East 1.5. However, it is to be noted that there are comparatively few non-farm as well as farm residences in the eastern part of Strathcona, since the main industrial development of the City of Edmonton has taken place in this particular area.

Finally an evaluation as well as a schematic representation of the connection between population density and distance from the edge of the contiguously built-up area has been made. The investigation is based on the settlement density figures (Figures 18 a-d) as arrived at earlier. The areas with the highest population density are generally located close to the inner fringe zone boundary, but many exceptions are found, mainly depending on the fact that much development has taken place in strings along the highways.

In order to show the gradually decreasing population density with increasing distance from the inner fringe boundary, the whole fringe zone was simply divided into three concentric zones, each of them about 1 mile wide. Any other

arrangement proved impracticable since the population concentrations occur relatively haphazardly, as indicated by the fact that at least six residential subdivisions with high population density are found in the outer most fringe zone. Table XI shows the number of quarter-sections and residences and the actual population density in each zone.

TABLE XI - THE RELATIONSHIP BETWEEN POPULATION DENSITY AND DISTANCE FROM THE CITY

Zone	Number of Quarter- Sections	Number of Residences	Number of Residents	Population Density/ Quarter-Sec.
Inner	138	335	1,340	10
Middle	173	237	948	5
Outer	189	209	836	4
Total	500	781	3,124	

The fringe zone around Edmonton is very sparsely populated, and the zone with the highest population density has only ten persons per quarter-section (40 per square mile) according to Table XI and Figure 19. The zone closest to the City has the highest density and the number of persons per quarter-section decreases with increasing distance from the urban area. The second zone has a population density of five persons and the third four persons per quarter-section (20 and 16 persons respectively per square mile). It has



Fig. 19 Correlation between Population Density and Distance to City

Legend:

Zone 1; Inner Zone (Density 10 people per quarter section)

Zone 2; Middle Zone (Density 5 people per quarter section)

Zone 3; Outer Zone; (Density 4 people per quarter section)

Each Zone 1 mile wide

to be noted that the average density for genuine rural areas in Alberta, according to the provincial census, is 0.5 persons per square mile. The figure for the rural-urban fringe zone is thus between that for the genuine rural areas and that for the City, even if in the case of Edmonton, it comes considerably closer to the rural density figure than to the urban, which averages about three thousand persons per square mile.¹¹

¹¹ According to the Dominion Bureau of Statistics in 1966, 93.9 per cent of the total population in the Edmonton Metropolitan area lived within the corporate limits of the City of Edmonton, 2.4 per cent lived in the Town of St. Albert and the rest, 3.7 per cent, lived in the remaining metropolitan area.

CHAPTER IV

GENERAL SURVEY OF LAND USE IN THE RURAL - URBAN FRINGE ZONE

The diversity of land uses in the rural-urban fringe zone has already been pointed out. In this chapter, a general description will be made of the various land uses in the rural-urban fringe zone of Edmonton. The land-use map (Figures 22 a-d) is based on aerial photographs combined with comprehensive field studies. The actual land use has been classified into nine major categories, some of which have been further sub-divided into smaller groups. The four sub-areas - Strathcona East, Strathcona South, Stony Plain, and Sturgeon - will be treated separately, although at the end of Chapter V a general survey of the urban development in the total rural-urban fringe zone will be given.

The following photographs will provide a general impression of the present land-use pattern in the rural-urban fringe zone of Edmonton (Figures 20a-e and 21a-e).

The study-area is traversed by a great number of highways and other arterial roads, and each one of the four sub-areas of the fringe zone has easy access to at least one highway (Figures 22a-d). The small eastern part of the Strathcona area has no less than three highways passing through it - Highways 16, 16A and 14A. In the same area the construction of the Edmonton Freeway, at present called Highway 14, is already underway. The railway network is also well-developed here. This was initially one important location



Fig. 20a Sturgeon, Rural area undergoing transition



Fig. 20b Strathcona East, Non-farm residence, former farm, bordering an oil refinery



Fig. 20c Sturgeon, Abandoned farm surrounded by unimproved land



Fig. 20d Strathcona South, Abandoned farm

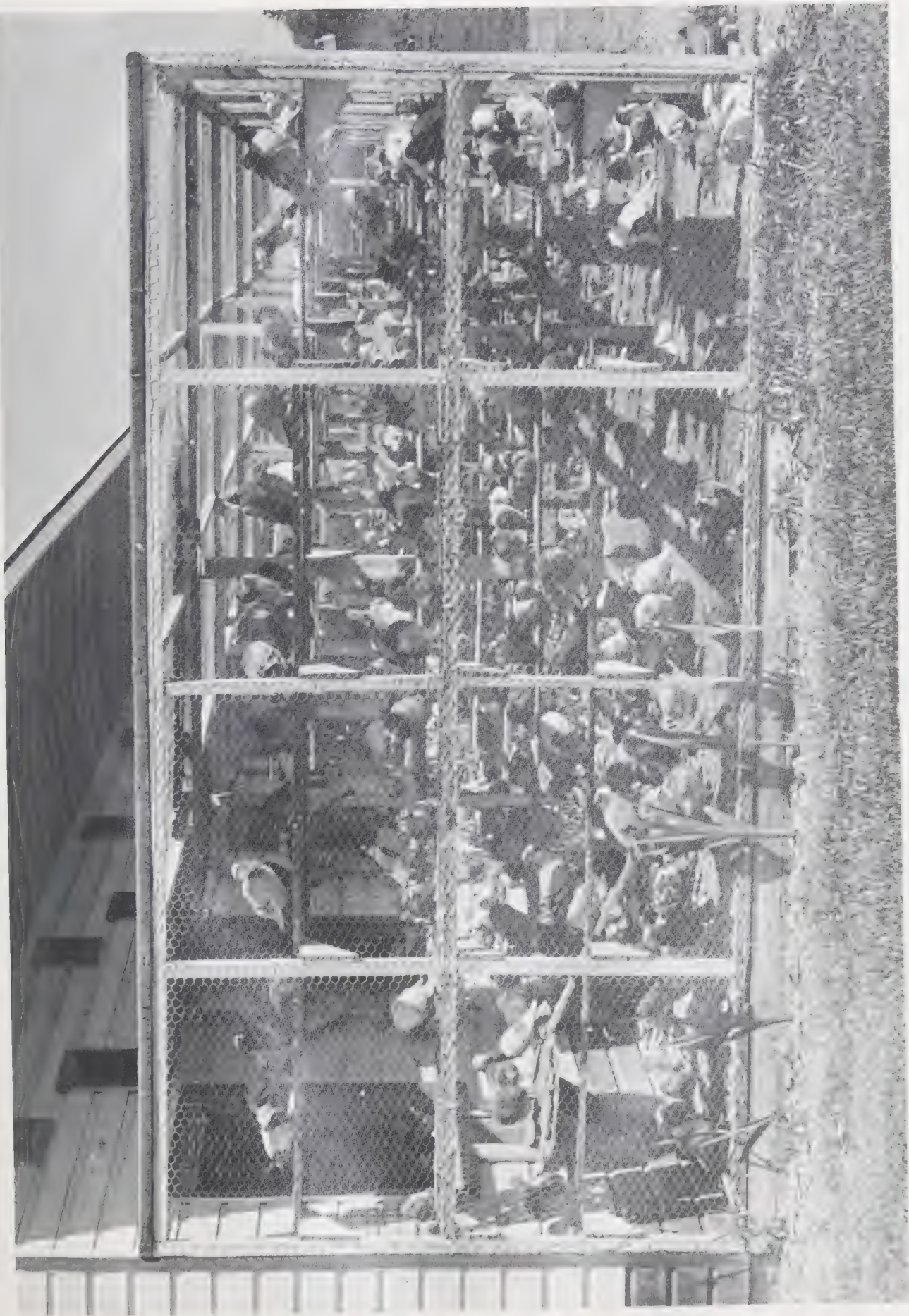


Fig. 20e Stony Plain, Pigeon farm



Fig. 21a Sturgeon and Strathcona East sub-areas, A good example of heterogeneous land use in a transitional zone

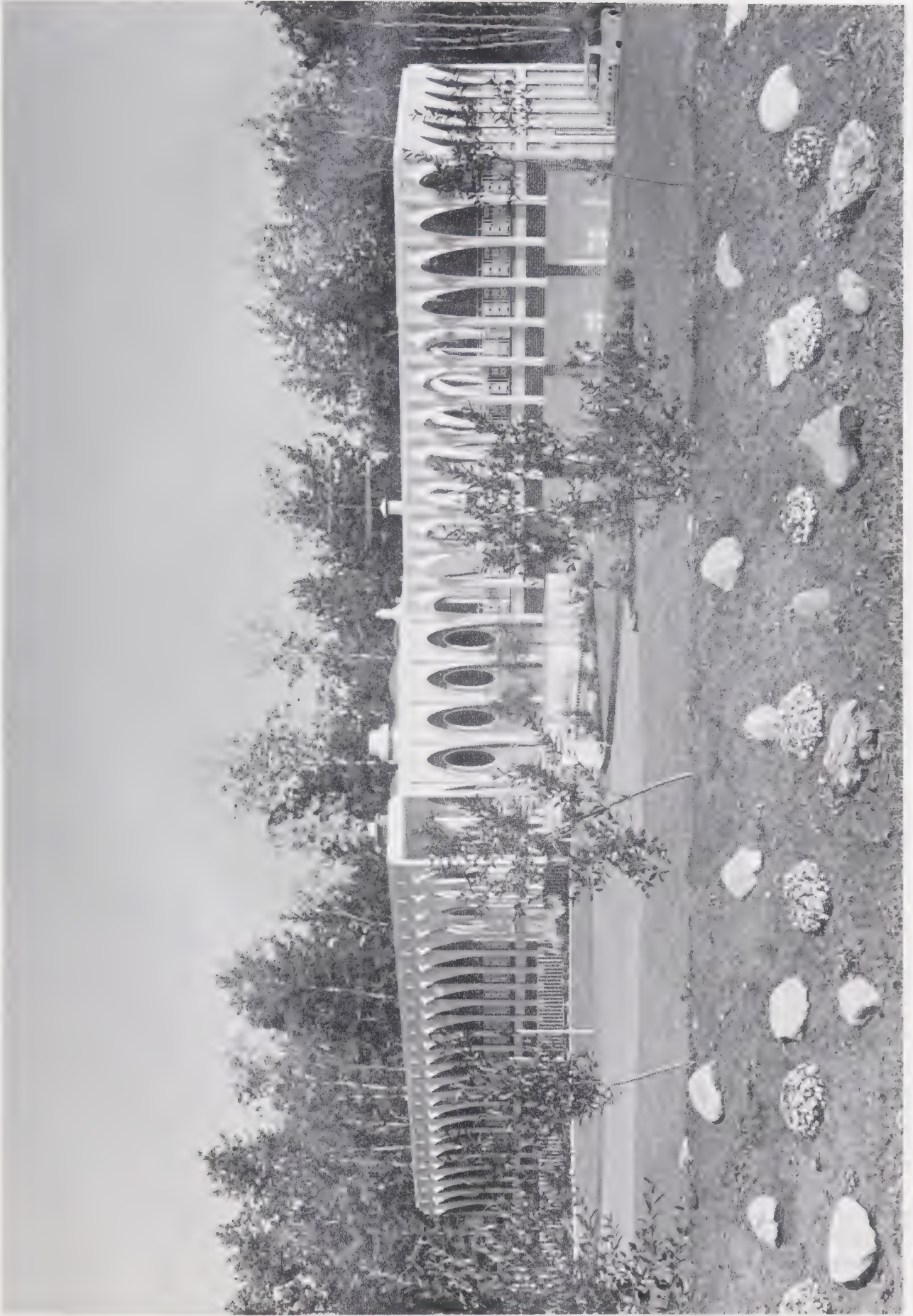


Fig. 21b Stony Plain, Fringe zone non-farm residence I



Fig. 21c Strathcona South, Fringe zone non-farm residence II



Fig. 21d Stony Plain, Commercial ribbon development along Hw. 16



Fig. 21e Stony Plain, Auto Wrecking

for the diverse industrial undertakings which have established themselves in the northeastern part of the area. Additional side tracks have been built during the more recent years in order to satisfy the demands from the increasing number of industries located there.

In the south Highway 2, also called the Calgary Trail, conducts the heavy traffic between Edmonton and Calgary. Especially that part of the highway which passes through the rural-urban fringe zone of Edmonton has a very high traffic intensity, since all traffic to and from the International Airport also uses this particular traffic route.

Of the four sub-areas of the fringe zone, Stony Plain has probably the least developed road system. Most of the traffic flow is collected along Highway 16. Here, as along the Calgary Trail, considerable commercial development in the form of motels, restaurants, and service stations has taken place on both sides of the road. The Jasper and Athabasca Railways also cross the area in the northwest, and have attracted industry to locate there.

The Sturgeon district is the largest of the sub-areas and has a well-integrated road system. The three main traffic arteries are the St. Albert Trail, and Highways 28 and 15. The whole northern fringe zone is very lightly industrialized and commercial strip-development along the main traffic routes is not especially abundant except for the St. Albert Trail.

The present land use in the fringe zone is influenced

by several factors. Agriculture has traditionally been the main function of the area, due to good soil and proximity to the City; but social, political and economic factors have caused the out-migration of typical urban functions to this rural-urban fringe zone. Many residences during the past years have grown up here. One fringe settler explained the choice of the fringe zone location of his home as a consequence of "the humdrum and fast pace of city life". Generally, the fringe zone is considered to be a healthier place in which to raise a family, as compared with the densely built-up city. Several commercial and industrial enterprises have been established in the zone, since government control is less outside the incorporated city than within, and also because lower land prices and greater transportation mobility exist here.

(i) Strathcona East: Land Use

The impact of the intrusion of the city has brought with it a great diversity of land uses within the 28 square miles which make up this part of the fringe zone (fig. 22a). Roughly 10 per cent of this entire sub-area is located within the city boundary. The land-use pattern appears chaotic, and is indicative of an earlier lack of planning concern. The area is characterized by many empty lots awaiting future development and countless "For Sale" signs foretell the forthcoming urban encroachment. Relatively new non-farm residences intermingle with abandoned and tumble-down farmhouses, and with rows of tall, round tanks belonging to the oil industry.

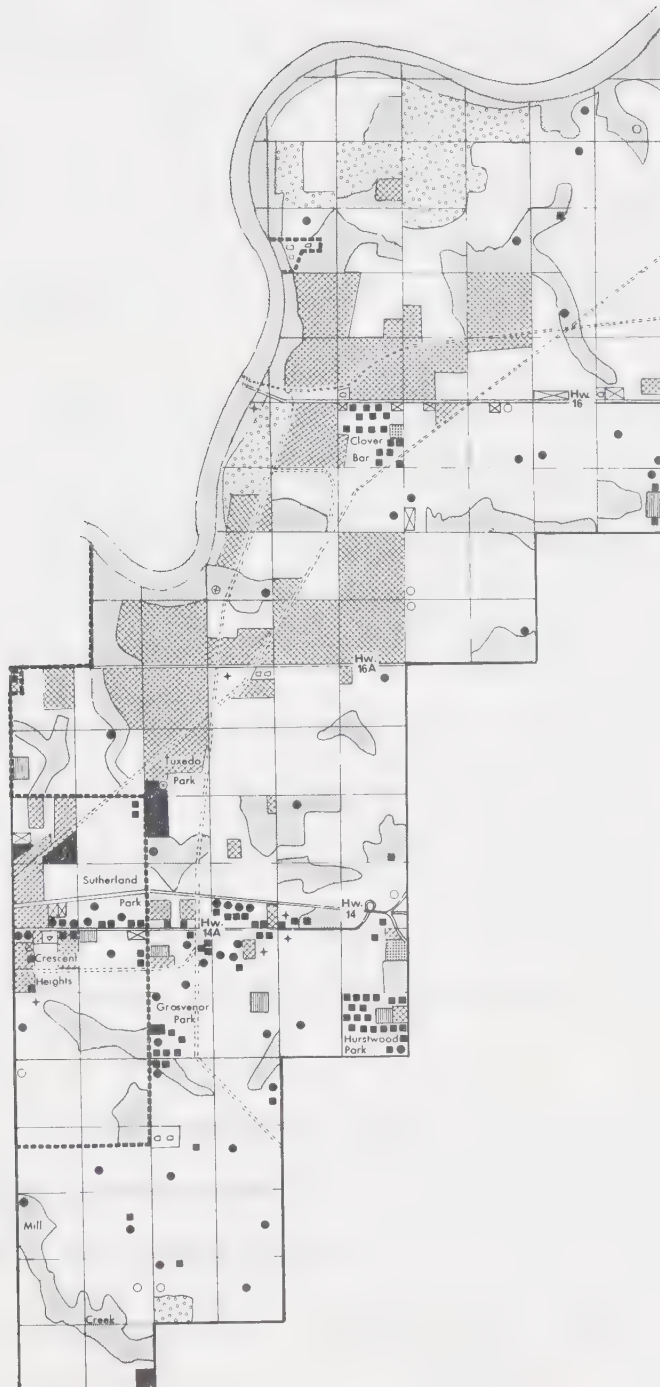


Fig.22a Strathcona East

LAND USE

Legend:

- Timber, Unproductive Brush, Maintained Parklands
- Gravel, Sand, Soil
- Agriculture
 - Farm
 - Abandoned Farm
 - Former Farm (Non-farm residence)
 - Stable
 - Feedlot
- Non-farm Residence
 - Abandoned Non-farm Residence
 - Trailer Camp
- Industry
- Commercial
 - Abandoned Commercial
 - Auto Wrecking
- Recreation
- Institutional
 - Abandoned Institutional
 - Cemetery
- Public Utilities
- Highway
- Railway
- City Boundary

Scale; 1" - 1,5 miles

Chains of heavy smoke spout from the chimneys of the numerous industrial buildings and mix with the noxious smells from the oil refineries, drowning great parts of the area in an essentially unhealthy bath.

The location of industry in this area has historically been influenced by the railroad facilities. At the present day, industrial land planning with the following motivation is recommended for this part of Edmonton:

Industries which require large parcels of land and which may be obnoxious or dangerous would locate in the industrial expansion area east and north-east of Edmonton. Prevailing winds will carry obnoxious odors away from the City; outlets for industrial sewage will be downstream from the City. In addition the natural buffering of this industrial area by the River Valley makes it particularly suitable for the suggested uses. ¹

Oil refineries and a variety of chemical industries related to the oil resource dominate the middle and northern part of the area, whereas light manufacturing plants generally are located farther south, in the vicinity of Highway 14 and close to the city boundary or within the inner fringe part of the city.

The British American Oil Company and Imperial Oil have established plants along Highway 16, and the refineries extend over large tracts. The occurrence of unimproved farmland and abandoned farms around these oil concerns indicates that the land is in the process of being taken over for future industrial development. Parts of the already company-owned land is rented to farmers and are in intensive

¹ City of Edmonton, General Plan. Edmonton, 1967, p.70.

agricultural use. Storage of pipelines and other equipment associated with the oil industry occupies many acres of former farmland, especially along railway tracts.

The dominating land use in the very northern part of Strathcona East has been the extraction of sand and gravel. Most of the gravel pits are nowadays abandoned, and the same is true of coal mines along the river south of the Clover Bar Bridge.

Upon studying the Land Use Map (Fig. 22a), the visual impact of non-agricultural land uses becomes significant, but the acreages involved are still small compared with the area devoted to different types of farming. Close to the city, the farms are usually small, but due to high specialization and low transportation costs, economic farming can still be carried out. One feature that is typical of the rural-urban fringe zone of Edmonton is the abundance of stables, which for the purpose of this thesis have been classified as farms, since they depend upon land for crops and grazing. Most of the stables provide riding lessons and board horses which are owned by city people, and may equally well have been considered as commercial enterprises. There are six stables of varying size in Strathcona East, of which at least four provide riding lessons. The others breed horses for sale.

The total number of operating farms in this portion of the fringe zone is 52. The number of abandoned farms amounts to ten, of which eight are completely abandoned and two used

exclusively for residential purposes. The farmland has either been taken over for industrial or other non-farm uses or amalgamated with surrounding farm areas. The above figures show that 16 per cent of the total number of farms in the area no longer function as independent farm units. Even though the land is usually improved, there is comprehensive land speculation taking place in this sub-area, and most farmers seem inclined to sell their farms or at least a portion of them if offered a "good" price. Completely unimproved land mainly occurs around the industries in the central and northern parts of the area and also on both sides of the new freeway north of Highway 14A.

Subdivision for residential development has taken place in the area, but in reality few lots have become developed. Clover Bar and Hurstwood Park are exceptions. The former is located in the northern part of the area, and the residential development which has taken place there is of fairly low quality, and most houses are now more than ten years old. The fact that this district is zoned for industry explains why the houses are generally poorly maintained. The latter zoned and developed subdivision is Hurstwood Park, situated half a mile south of Highway 14 and in the fringe zone. This district contains nineteen single family residences and one farm of rather good quality. One subdivision, the Grosvenor Park, contains only a couple of residences; the rest of the area being crop-land, except for one plot, which is being used for auto wrecking. Another form

of residential development, the "Wilson Trailer Court", is found on the south side of Highway 14.

The commercial land use within this sub-area is of minor extent and is mainly found along the highways. The business activity in Strathcona East is represented by one lumber yard, one welding shop, one small cafe, some motels, gas stations, and two small grocery stores. Shopping in the area seems nearly equally split between the shopping centers in Edmonton and Sherwood Park, which is the newly-developed residential district immediately east of the outer fringe boundary. As previously mentioned, only two grocery stores were found within the actual fringe zone of this sub-area.

One significant form of commercial - industrial development, with respect to space used, is the auto-wrecking lot. In this particular sub-area, there are at least four, three of which extend over several acres. Auto wrecking and junk yards are probably the most frequently described fringe characteristic, and they surely aid in creating a very special "shimmer" to an already chaotic scene.

Other land uses not previously discussed which exist in this sub-area include unproductive brush, recreation, institutions, and utilities. Unproductive brush land occurs frequently, especially where the drainage is poor. Some of the stands have utility as wind-breaks. There are also a number of recreational facilities, such as the Happy Acres Go-Kart Park, the newly built Centennial Sports Arena, a drive-in theatre, and two hockey rinks. One small church in Clover

Bar and a school located adjacent to the Highway 14 interchange on the eastern margin of the study area are the only two examples of institutional land uses in Strathcona East. Finally, the public utility land use is made up of the East Edmonton Power Plant, which the City is constructing north of Highway 16, together with some electrical power sub-stations and a city dump.

(ii) Strathcona South: Land Use

The eastern part of this sub-area has a land use similar to that of Strathcona East (Fig. 22b). There is a great diversity of industries with the major concentrations occurring within the city boundaries. Cement, construction, and machine industries are well represented. Although there are no oil refineries here, the oil industry is indirectly represented by a couple of big oil drilling firms and pipe-line depots. The largest of the service industries in the area is the MacCosham's Moving Service, which has large storage magazines along the Calgary Trail. Their main localization considerations have been good accessibility to both highway and railway, distance from major city traffic, and availability of space. Proximity with respect to the city's markets has been one important factor for Labatt's Brewery in locating in the rural-urban fringe zone. Their situation on Highway 2 is also convenient for truck-transport of the finished products. The Edmonton Liquid Gas Company is located south of the city border, also on Highway 2, and is one of

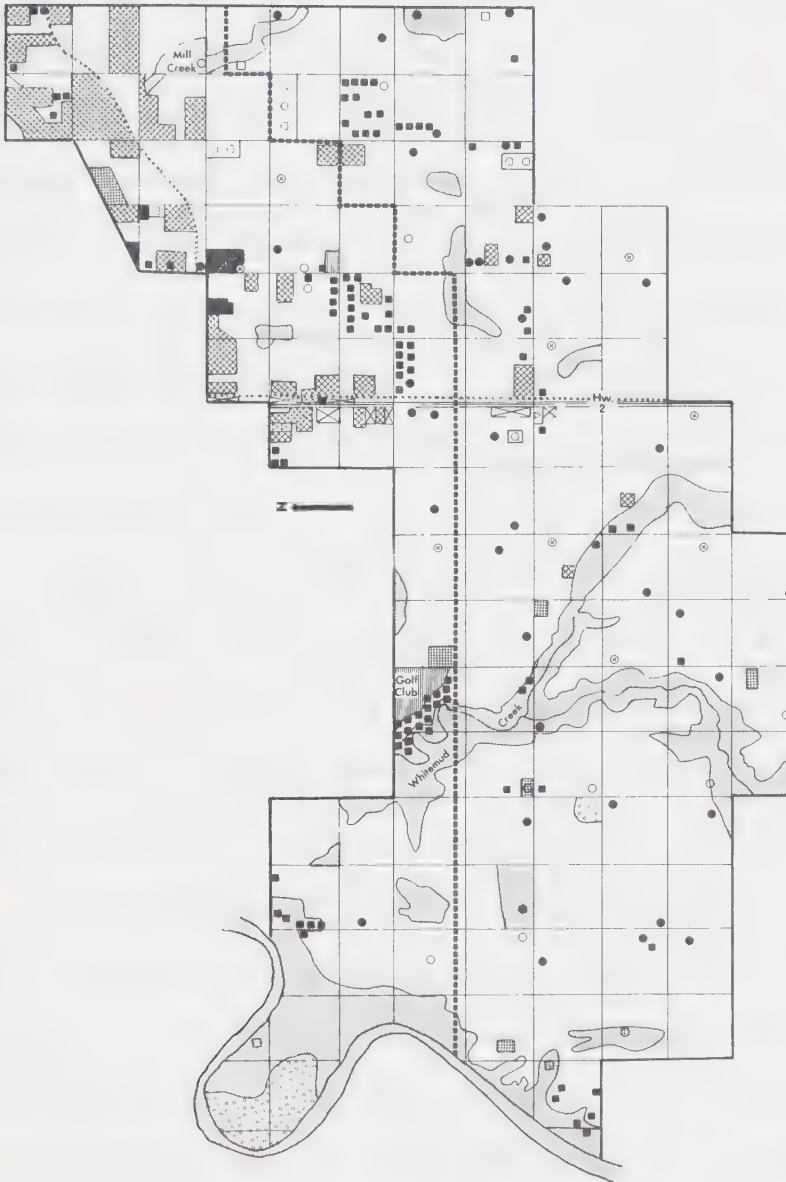
Fig. 22b Strathcona South

LAND USE

Legend:

-  Timber, Unproductive Brush, Maintained Parklands
-  Gravel, Sand, Soil
-  Agriculture
 - Farm
 - Abandoned Farm
 - ◊ Former Farm (Non-farm residence)
 - + Stable
 - ⊠ Feedlot
- Non-farm Residence
 - Abandoned Non-farm Residence
 - ▷ Trailer Camp
-  Industry
-  Commercial
 - ⊠ Abandoned Commercial
 - Auto Wrecking
-  Recreation
-  Institutional
-  Abandoned Institutional
-  Cemetery
-  Public Utilities
- Highway
- Railway
- City Boundary

Scale; 1" = 1.5 miles



the few big firms outside the city limits. The generally non-continuous nature of the industrial development in this sub-area has resulted in an often broken pattern of land use. Many empty patches of vacant land remain between the industrial plants; the land usually being unimproved and for sale.

Except for strip development of a commercial and industrial nature taking place along the Calgary Trail, the area west of the highway has a comparatively rural character. There is, however, a number of abandoned farms here, more precisely, eleven west of the highway and nine east of it. These show that the influence from the city is felt also in relatively rural parts of the fringe zone. There are altogether forty farms in the southern part of Strathcona, which still function as farms. They are, as a rule, big and well-kept and most are situated in the outer fringe zone. No stables have been developed here, but a kennel replaces this type of land use in this part of the fringe zone.

Considerably more land is used for residential purposes in the southern part of Strathcona than in the east. About nine of the former farms in the area serve as non-farm residences today, and many of them are occupied by older couples. The quality of the residences varies a great deal; dwellings range from large ranch style houses to small wooden shacks. In the north, close to the inner boundary of the fringe zone and within the corporate limits of the city, low density residential development is taking place and expanding at a

rapid rate. This particular part of Edmonton is zoned for low density residential development and is planned to be one of the main urban growth areas in the future.²

Two residential subdivisions are found outside the city boundaries, one close to the industrial area in the eastern part of the fringe zone, and one in the River Valley in the west. The last-mentioned of the two has a very high standard, whereas some of the residences in the eastern subdivision are of low quality and poorly maintained. Some of them are also for sale. The wooded area along Whitemud Creek offers excellent sites for country residences and some development of a very high class has taken place there. However, the major part of this beautiful ravine, together with the River Valley, is in the General Plan suggested to be preserved for recreational purposes.

The high proportion of abandoned farms in this sub-area (50 per cent), has been mentioned earlier. Several residences in the area have also been given up. Some of them are furnished with "For Sale" signs which in many cases appear to have been there for years. Adjacent to Whitemud Creek the fringe zone's only abandoned church was found, now almost over-grown with brush.

The commercial activity is concentrated on Highway 2 and is of the usual road side service type: motels, drive-in restaurants, auto repair shops, and gas stations. The sub-area's auto wreckers are here all located within the city limits and consequently subjected to more rigorous restric-

² Ibid., p. 42.

tions concerning upkeep. There are several institutions, mainly of a religious nature, and among them the Holy Redeemer College, pleasantly sited in the River Valley.

The Whitemud Creek ravine and the River Valley offer excellent possibilities for recreation. There is one golf course, the Derrick Golf and Winter Club, and a large field for snow mobiling which provide amenities for those who prefer more organized occupations during their leisure hours. The public utility land use is represented by radio stations and a big city dump.

(iii) Stony Plain: Land Use

The predominant land use in this entire sub-area is agriculture (Fig. 22c). South of Highway 16 many of the farms are shown as leased or rented and the actual owner of the land as living in Edmonton. A comparatively large portion of the land acreage is unimproved, especially in the West Jasper Place district, an area which is the subject of special interest from the Edmonton City Council for annexation purposes (Fig. 3).³ Big and generally well kept farm holdings appear further west of West Jasper Place. Visually, farm land predominates north of Highway 16 as well, but great tracts there suffer from poor drainage which reduces their suitability for farming, although not for stable establishments. A few large stables were found, the owners of which

³ According to a special study which has been made in the area (Edmonton City Planning Department: West Jasper Place Outline Plan, Edmonton, 1967, p. 30), it would be possible to accommodate almost 70,000 people here in the near future.

Fig. 22c Stony Plain

LAND USE

Legend:

- Timber, Unproductive Brush, Maintained Parklands
- Gravel, Sand, Soil
- Agriculture
 - Farm
 - Abandoned Farm
 - ◊ Former Farm (Non-farm residence)
 - + Stable
 - ⊠ Feedlot
- Non-farm Residence
 - Abandoned Non-farm Residence
 - ⊠ Trailer Camp
- Industry
- ⊠ Commercial
 - ⊠ Abandoned Commercial
 - Auto Wrecking
- Recreation
- Institutional
 - ⊠ Abandoned Institutional
 - ⊠ Cemetery
- ⊠ Public Utilities
- Highway
- ⋯ Railway
- City Boundary

Scale; 1" - 1,5 miles



declared that the soil was wet and heavy and not good for crops.

There are altogether forty-three farms in the Stony Plain fringe sub-area. Thirteen farms are abandoned, the farmhouses in four cases still being used as residences. Four stables in all are located in the Stony Plain fringe zone. An interesting feature in this sub-area, and noted as an example of the variety of land uses which occurs in the rural-urban fringe zone, is a "pigeon farm" found in a residential subdivision along Highway 16 (Fig. 20f). An Edmonton physician keeps hundreds of birds here for scientific purposes. In spring when the new broods are hatched intending purchasers can get a pet bird for the family at a reasonable price.

The existing residential development is confined to four areas, of which the most dense population occurs in one large subdivision north of the Edmonton-Jasper-B.C. railway, and along the ravine lands in the south. The other concentrations of settlements are found along Highway 16 and in the Alberta Park, located within the corporate limits of the City in a district designated for industrial development. Few of the holdings there, as well as along the highway, are occupied by substantial buildings. Scattered over the whole area are various types of residences, and the general impression is that this is a popular tract in which to locate a country home for families of above-average economic circumstances. (See Fig. 21b).

A large number of plots is now being laid out in the ravine area, and offered for sale at comparatively high prices.

Gas and oil wells are scattered throughout the landscape in the middle part of the Stony Plain sub-area, and to the north some industrial development has taken place. The presence of convenient transportation facilities has also here been the dominant location factor. Relatively low land prices, because of the land's limited suitability for agriculture, has also played a certain role in the concentration of industrial plants here. Industries which have substantial land requirements, for example lumber, brick and cement, are frequently represented.

A significant portion of the area is occupied by forest and unimproved brush. Two country clubs have located in pleasant wooded areas, one in the River Valley and the other in the lake area close to the town of St. Albert in the northwest. Other recreation facilities are a car-racing park, an outdoor movie theatre, and some sports fields.

The commercial activity is almost entirely concentrated on Highway 16, where many motels, restaurants and gas stations serve tourists and their vehicles. In the east, bordering the City, a disorderly and half-abandoned lumber yard extends over several acres of land. One mile north of the highway, the remaining wooden framework of the yards and

houses of a redundant livestock buying station is to be found. Further north the relatively new "Edmonton Potato Growers Ltd." warehouse is established. Several lots in the eastern, industrial part of the Stony Plain sub-area are occupied by auto-wreckers.

The public utility and institutional land uses are few in this area. The CFRN Radio and Television station has its main broadcasting headquarters on Highway 16, and another radio station is located in the Alberta Park. Another and less ideally located utility land use here is a large dumping area immediately west of the City boundary. The institutional land use, finally, is represented by a big elementary school and two army barracks.

(iv) Sturgeon: Land Use

The northern portion of the fringe zone, located mainly in the Municipal District of Sturgeon, is the largest of the four fringe sub-areas, and extends over roughly 40 square miles, 5 of which lie within the City. (See Fig. 22d). The remarkable fact about this sub-area is that very little industrial development has taken place here. The few industries found are scattered throughout the whole sub-area and are primarily of construction-storage types.

In terms of acreage, agriculture is without comparison the dominating land use. Outside the inner fringe zone boundary the farming industry seems to be very stable, with little obvious urban influence. Comparatively few



Fig. 22d Sturgeon

LAND USE

Legend:

- Timber, Unproductive Brush, Maintained Parklands
- Gravel, Sand, Soil
- Agriculture
 - Farm
 - Abandoned Farm
 - ⊙ Former Farm (Non-farm residence)
 - + Stable
 - ⊠ Feedlot
- Non-farm Residence
 - Abandoned Non-farm Residence
 - ⊞ Trailer Camp
- Industry
- Commercial
 - ⊠ Abandoned Commercial
 - Auto Wrecking
- Recreation
- Institutional
 - ⊠ Abandoned Institutional
- Cemetery
- Public Utilities
- Highway
- Railway
- City Boundary

Scale; 1" = 1.5 miles

farms were marked for sale and the general attitude amongst the farmers was that they preferred to remain on their land, even if they were aware of the possibilities of making a good profit by selling. Large acreages, but generally small holdings prevail close to the City boundary, whereas the farm holdings, evidently prosperous, increased in size with distance from the City. In the summer of 1968, there were seventy-seven farms and eight stables in operation in this area. Abandoned farms amounted to forty-one, most of them being situated within the city environs. Twelve of the former farm houses were used as residences. The above figures show that on 53 per cent of the farms, ordinary farming operations are no longer carried out.

In the southeastern part of the sub-area and within the City, a number of feed-lots and piggeries are located. These operations are a definite nuisance and attempts have been made by the City Authorities to remove them from the present location and relocate them in another area where they would cause less trouble. A future need for additional commercial and light industrial space in northeastern Edmonton will probably enable feed-lot owners to sell their land at a greater profit than at present and thus solve the whole problem. However, many City dwellers who daily are confronted with the odors from these operations feel that such a gradual phasing out of the feed-lots is unsatisfactory; they still call for immediate remedial action from the City Authorities.

The wide variety of land uses in the inner fringe zone of the sub-area is remarkable, and found nowhere else in the rural-urban fringe zone of Edmonton. For instance, in the subdivisions of Summerville and Brooklyn Gardens, within the City boundary, there are found one lumber industry, one mink farm, one poultry farm, three abandoned farms, and several residences of various quality, all within one square mile.

The non-farm residences are concentrated in subdivisions within the City or immediately north of the City boundary. The average age of the houses is rather high for the whole sub-area; most costly houses are found scattered over the landscape, especially in wooded areas located some distance from the City. Residential development in strings along the highways occurs more frequently here than in any other part of the fringe zone, and seems to have replaced the commercial activity, which usually dominates the main traffic arteries. There is no commercial land use on Highway 28, and only two small enterprises have located along Highway 15, whereas the St. Albert Trail has some motels and gas stations.

Five auto wreckers have established in the Sturgeon fringe portion, a couple of them being extremely chaotic in character and extensive. A single public utility land use has been noted, but Calgary Power Company has recently bought up land in the area, and probably plans to locate plants on these sites. The recreational land use includes a speedway park, a horse-racing park, an outdoor theatre, a golf course, and a sports field. The Speedway Arena is probably the

biggest and most expensive recreational facility in the greater Edmonton area.

Institutional land use, as well as recreational, embraces large areas in this northern fringe zone. In the northeast, the Alberta Hospital extends over almost three quarter-sections of land. The hospital was already founded by the end of the nineteenth century and today has about 1,100 patients. Farther south there are two other institutions - the Alberta Institution for Girls and the Belmont Rehabilitation Center, and, in the west along St. Albert Trail, a religious seminary.

CHAPTER V

LAND USE DIVERSITY IN THE RURAL - URBAN FRINGE ZONE OF EDMONTON

In Table XII and Figure 23, a summary and graphic illustration are given showing the diversity of land uses for each of the four sub-areas in the total rural-urban fringe zone. No figures are provided for the number of industrial units, a fact which tends to reduce the value of the table. No further detailed discussion will be undertaken here concerning all different land uses in the zone. However, the more significant uses have been listed and compared in the following table. Considered as significant land uses are farms, abandoned farms, non-farm residences, and commercial land uses, since these categories together make up about 90 per cent of the total land use in the fringe zone. In the category "non-farm residences" is included "non-farm residences, former farms".

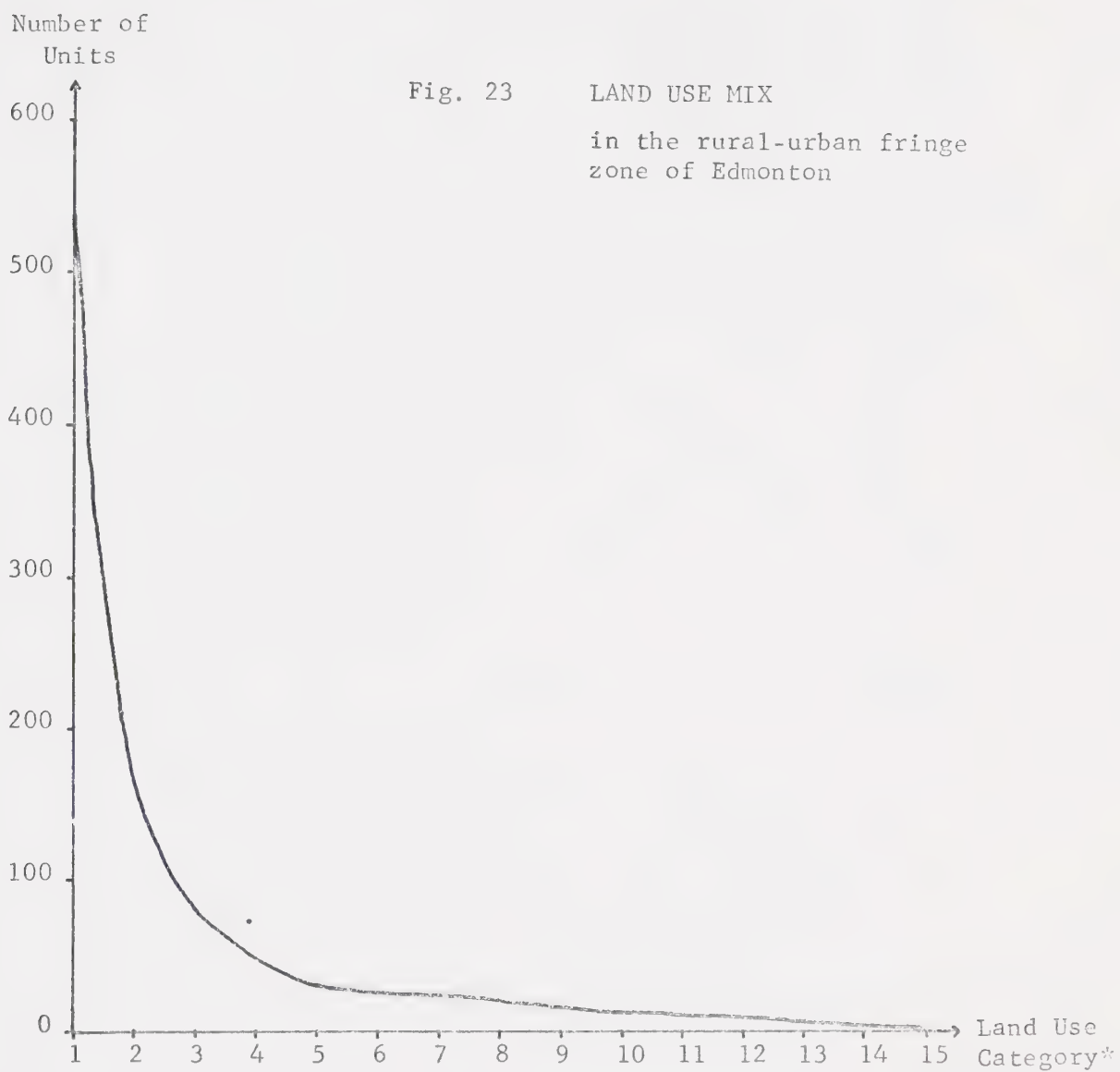
As shown in Table XIII, Strathcona East has a relatively stable agricultural base, indicated by a high figure for farms in operation, combined with a low number of abandoned farms (the ratio of farms to abandoned farms is 5.2 to 1.). The commercial activity is relatively low and there are considerably fewer non-farm residences than in any other portion of the fringe zone. However, the rural character is not significant for all parts of the Strathcona East sub-area, since the most comprehensive industrial development in Edmonton has taken place in the central and northern parts of the sub-area. This explains the fact that very few new residences

TABLE XII - LAND USE IN THE RURAL - URBAN FRINGE ZONE OF EDMONTON IN NUMBER OF UNITS
PER AREA AND CATEGORY

Category	Number of Units					Total Fringe Zone
	Strath. East	Strath. South	Stony Plain	Sturgeon		
Non-Farm Residence	86	122	139	177		524
Farm	52	40	43	77		212
Abandoned Farm	10	20	13	41		84
Commercial	14	17	22	12		65
Former Farm (Non-Farm Residence)*	(2)	(9)	(4)	(12)		(27)
Stable	6	0	4	8		18
Auto-Wrecking	4	4	4	5		17
Recreation	5	2	5	5		17
Public Utilities	5	4	4	1		14
Institutional	2	5	2	4		13
Abandoned Non-Farm Residence	0	4	0	4		8
Trailer Camp	1	2	3	1		7
Cemetery	0	0	0	3		3
Abandoned Institutional	0	1	0	0		1
Abandoned Commercial	0	0	1	0		1
Industry**	-	-	-	-		-
Total	185	221	240	338		984

* Figure included in "Abandoned Farm"

** No Figures Available



*The same order as in Table XII

are found. Most of the farms were here long before any form of industrial development occurred, and very little new construction of farmhouses has taken place.

The southern part of the Strathcona sub-area has still a rural character within certain areas, but Table X[III] shows that the area as a whole is undergoing urbanization. Only forty farms are located here, and the number of abandoned farms is relatively high, compared with the number of farms still in operation. Forty farms are still in operation while twenty are abandoned, which gives a ratio of 2.0 to 1. Non-farm residential land use dominates in the area, with the highest concentrations occurring in the inner fringe zone, and as an average 1.2 residences are located in each quarter-section. The commercial activity is higher here than in Strathcona East, with twenty-six commercial units as compared with twenty-one in Strathcona East.

Stony Plain has a comparatively low number of farms, but also a few abandoned farm holdings (ratio of farms to abandoned farms 3.3 to 1.), which points out what was previously said in the general description of the area, namely that the farms usually are big and located in the outer fringe zone, where the urban influence is not so prevalent. The figures for non-farm residential and commercial land uses are high: 1.2 and 0.2 units per quarter-section respectively.

There are 77 farms located in the Sturgeon fringe area, a figure which is much higher than for any other of

TABLE XIII - LAND USE FOR SELECTED CATEGORIES IN THE RURAL - URBAN FRINGE ZONE OF EDMONTON IN NUMBER OF UNITS AND PER CENT, AND NUMBER OF UNITS PER QUARTER-SECTION

AREA	LAND USE CATEGORY											
	Farm			Abandoned Farm			Non-Farm Residence			Commercial		
	No.	%	No./ Q.s.	No.	%	No./ Q.s.	No.	%	No./ Q.s.	No.	%	No./ Q.s.
Strathcona East	52	25	0.5	10	12	0.1	88	16	0.8	14	21	0.1
Strathcona South	40	19	0.4	20	24	0.2	131	24	1.2	17	26	0.2
Stony Plain	43	20	0.4	13	15	0.1	143	26	1.2	22	34	0.2
Sturgeon	77	36	0.5	41	49	0.3	189	34	1.2	13	19	0.1
Total Fringe Zone	212	100	0.4	84	100	0.1	551	100	1.1	66	100	0.1

the three fringe portions, but it has to be kept in mind that this northern fringe part is bigger than the other three. The average number of farm units per quarter-section is 0.5, the same as for Strathcona East. Abandoned farms are usually found close to the city, but this is not the case here. On an average, there are 0.3 abandoned farms per quarter-section in the area and these are scattered throughout the whole Sturgeon sub-area. The ratio of farms to abandoned farms is here 1.9. The residential development has mainly taken place in subdivisions located close to the City border and reaches a density of 1.2 units per quarter-section, the same as for Strathcona South and Stony Plain. The figure for commercial land uses is low: 0.1 units per quarter-section.

Table XIV illustrates the land use intensity in the rural-urban fringe zone. By "intensity of land use" is here understood the average number of land use activities, all categories included, which occurs within each quarter-section of the zone. The total number of units per area is derived from Table XII, and no figures for industrial land uses are included. The result is striking; the 984 separate land use units which are found in the rural-urban fringe zone are distributed almost equally over the area. The sub-areas of Strathcona South and Stony Plain have a land use intensity of 2.0 activities per quarter-section, and Sturgeon 2.1, whereas the figure for Strathcona East is somewhat lower: 1.7 activities per quarter-section.

TABLE XIV - LAND USE INTENSITY IN THE RURAL - URBAN FRINGE ZONE
OF EDMONTON PER AREA AND QUARTER-SECTION

Area	Total Number of Land Use Units Per Area	Total Number of Quarter-Sections Per Area	Land Use Intensity Units/Q.s.
Strathcona East	185	111	1.7
Strathcona South	221	110	2.0
Stony Plain	240	119	2.0
Sturgeon	338	160	2.1
Total Fringe Area	984	500	2.1

However, it can be assumed that the figure for land use intensity would have come to 2.0 also in the last area, if the industrial activity had been included, since the main part of Edmonton's industrial development has occurred within the eastern part of Strathcona. The average figure for land use intensity in the total rural-urban fringe zone amounts to 2.0 activities per quarter section.

Cartographic Interpretation of the Land Use Diversity in the Rural-Urban Fringe Zone

In the following sets of maps, an attempt has been made to give a visual summary of the diversity of land uses in the fringe zone. The grid which formed the base for the density map has been used here also. Each map set is followed by a table showing the degree of land use diversity, grouped into different categories, in per cent of total land

use. Figures will be provided for each of the four sub-areas as well as for the total rural-urban fringe zone. The first set of maps (Figures 24a-d) shows the degree of land use diversity within each quarter-section of the fringe. Only the number of different types of land uses within each quarter-section has been taken into consideration for this investigation. The following groups have been used:¹

Group 1 - Single Type

Multiple Type

Group 2 - Combination of Two Types

Group 3 - Combination of Three Types

Group 4 - Combination of Four or More Types.

The variations among the different sub-areas of the rural-urban fringe zone are fairly small, as seen from Tables XIV and XV. Strathcona East, with a combination of extensive industries and unified farming areas, has a low degree of land use diversity, for example a high proportion of quarter-sections accounts for only one type of land use (Figures 22a and 24a). According to Table XV, 68 per cent of the quarter-sections in this area belong in Group I. A wide variety of land uses occurs along the two highways, and the twenty quarter-sections which have three or more different types of land use are, almost without exception, concentrated along these traffic arteries.

Strathcona South and Stony Plain exhibit similar diversity figures and will therefore be dealt with together.

Both of them have 66 per cent of their land in a single use,

¹ The same categories of land uses will be used as in Figures 22a-d, except for the type "Timber, Unproductive Brush, and Maintained Parks", which is considered only in the few cases when it alone fills out a whole quarter-section.



Fig. 24a Strathcona East
LAND USE DIVERSITY

Legend:



Single type

Multiple type



Combination of two types



Combination of three types



Combination of four or more types

-----City Boundary

Scale: 1" - 1.5 miles

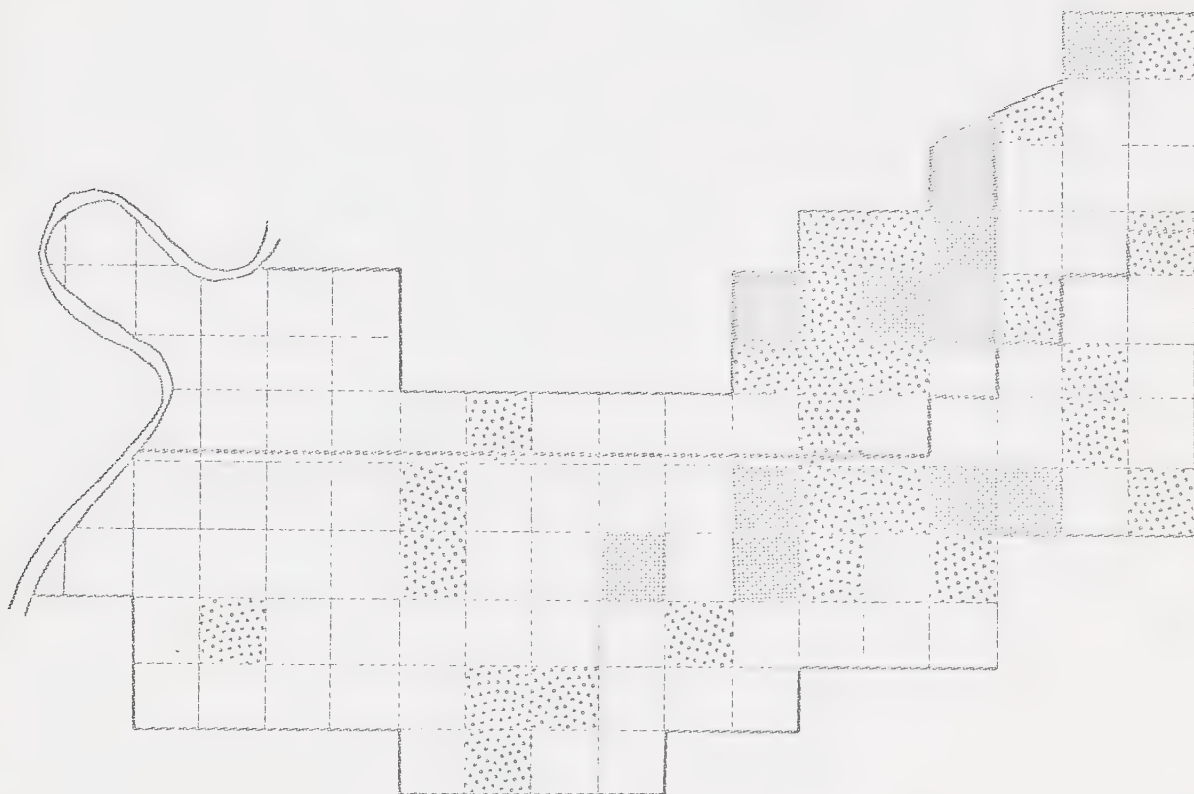


Fig. 24b Strathcona South
 LAND USE DIVERSITY

Legend:

- ☐ Single type
- Multiple type
 - ☒ Combination of two types
 - ☒ Combination of three types
 - ☒ Combination of four or more types
- City Boundary

Scale: 1" - 1.5 miles

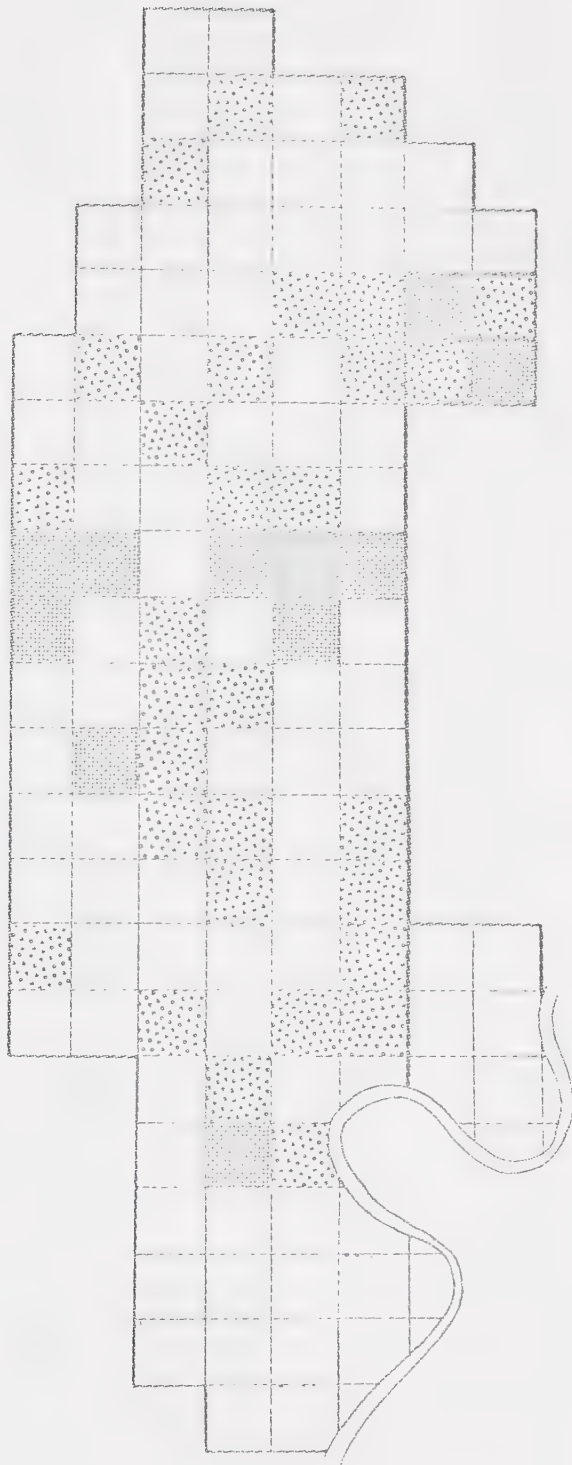







Fig. 24c Stony Plain

LAND USE DIVERSITY

Legend:

-  Single type
-  Multiple type
 -  Combination of two types
 -  Combination of three types
 -  Combination of four or more types

----- City Boundary

Scale: 1" - 1.5 miles

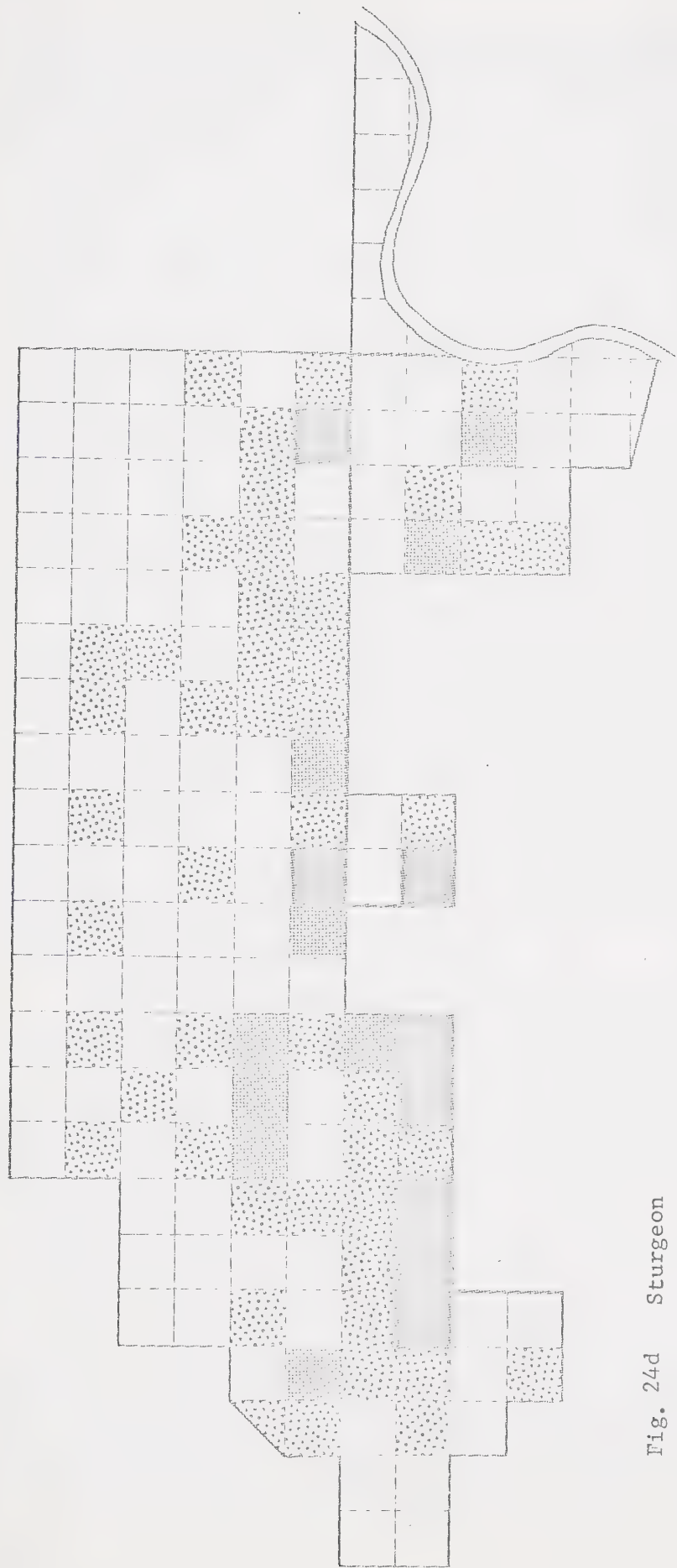


Fig. 24d Sturgeon

LAND USE DIVERSITY

Legend:

- Single type
- Multiple type
- Combination of two types
- Combination of three types
- Combination of four or more types

----- City Boundary

Scale: 1" - 1.5 miles

mainly agricultural, with the highest concentrations in the southwest on both sides of the North Saskatchewan River (Figures 22b - 24b and 22c - 24c). The quarter-sections which have a high degree of land use diversity are in Strathcona South concentrated on the highway and in the inner fringe zone northeast of Highway 2. Three quarter-sections in this area belong to the highest diversity group, having four or more different types of land use within each quarter-section, whereas Stony Plain only has one quarter-section in Group 4. As Table XV shows, the per cent land use distribution within these two fringe areas is similar, but the land use diversity patterns are still rather different, as shown in the two maps (Figures 24b and 24c). The quarter-sections with the highest land use diversity are concentrated in Strathcona South whereas the developments in Stony Plain are scattered and seem to be rather haphazard, and in that respect typical for rural-urban fringe zones.

Only 61 per cent of the land in the fringe portion of Sturgeon is in single use, also here mainly agricultural, and concentrated on the outer fringe zone (Figures 22d and 24d). Quarter-sections with two types of land use are frequently spread in the area, even though most of them are found relatively close to the City. The highest diversity of land use, three or more categories per quarter-section, occurs in the inner fringe zone. The diversity pattern in the Sturgeon sub-area is almost ideal for rural-urban fringe zone development; small units and high variety of land use

TABLE XV - DEGREE OF LAND USE DIVERSITY PER AREA AND QUARTER-SECTION IN PER CENT OF

TOTAL LAND USE

Sub-area	Group 1		Group 2		Group 3		Group 4	
	No. of Q.S.	% of Total Area	No. of Q.S.	% of Total Area	No. of Q.S.	% of Total Area	No. of Q.S.	% of Total Area
Strathcona East	75	68	16	14	14	13	6	5
Strathcona South	73	66	26	24	8	7	3	3
Stony Plain	78	66	30	25	10	8	1	1
Sturgeon	98	61	46	29	8	5	8	5
Total Fringe Zone	324	65	118	23	40	8	18	4

The total number of quarter-sections in Strathcona East is 111; in Strathcona South - 110; in Stony Plain - 119; and in Sturgeon - 160.

in the area closest to the inner fringe boundary and a gradual decrease in diversity with increasing distance from the City.²

Figures 25a-d illustrate rural and urban land uses in the fringe zone. The significance of "rural" and "urban" has been discussed in Chapter II. It is generally agreed that a clear differentiation between the two no longer can be made. However, for the purpose of this study, "rural" stands exclusively for agricultural land uses, which here include farms, stables, feed-lots, abandoned farms, as well as the category "gravel, sand, and soil". Timber and unproductive brush should rightly be considered as rural land uses, but in the land use map (Figures 22a-d), no differentiation has been made between these two categories and "maintained parks", of which the latter is considered to be a type of urban land use. All remaining categories shown on the land use map are classified as urban land uses.

The following five groups have been determined in order to illustrate rural and urban land uses in the fringe zone.

Group 1 - Agricultural

Group 2 - Agricultural plus other land use(s)

Group 3 - Industry

Group 4 - Other urban land use(s)

Group 5 - Timber, unproductive brush and maintained
parklands.

² Appendix II shows a tableau of Land Use Diversity in the fringe zone.

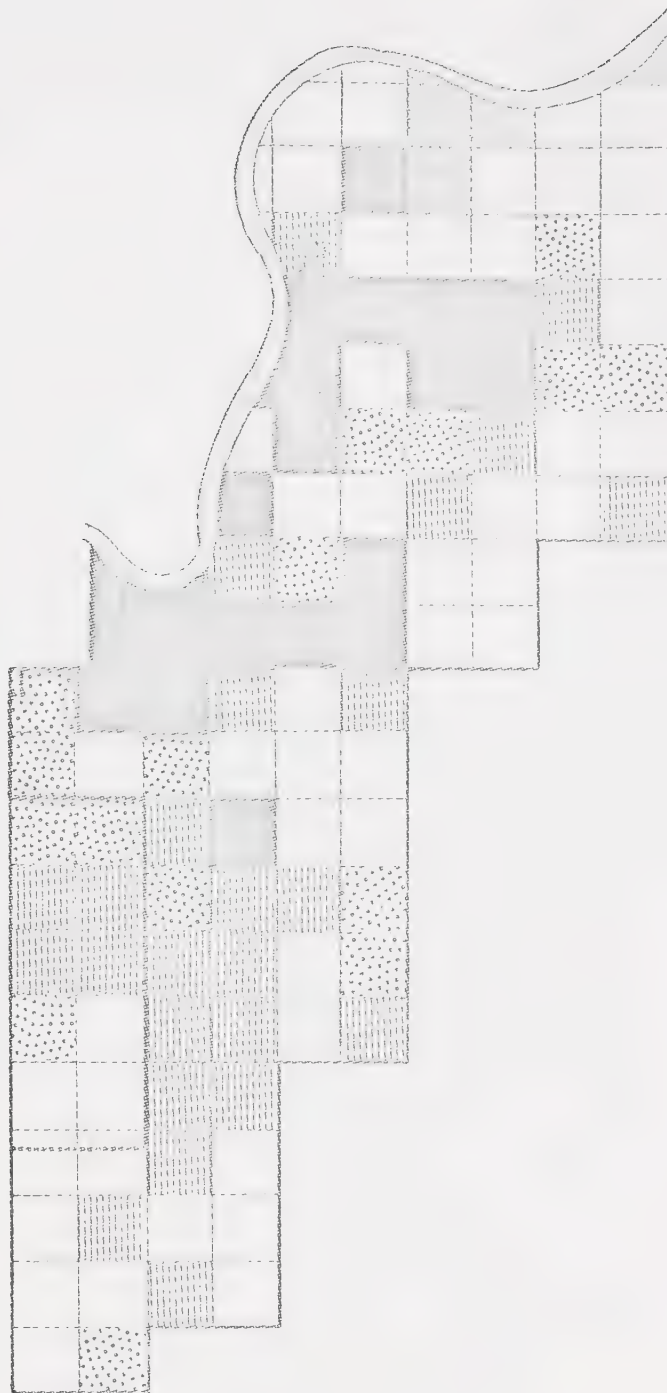








Fig. 25a Strathcona East

RURAL AND URBAN LAND USES

Legend:

- | | | | |
|--|------------------------------------|---|---|
|  | Agriculture |  | Timber, unproductive brush and maintained parklands |
|  | Agriculture plus other land use(s) |  | City Boundary |
|  | Industry | | Scale: 1" - 1.5 miles |
|  | Other urban land use(s) | | |

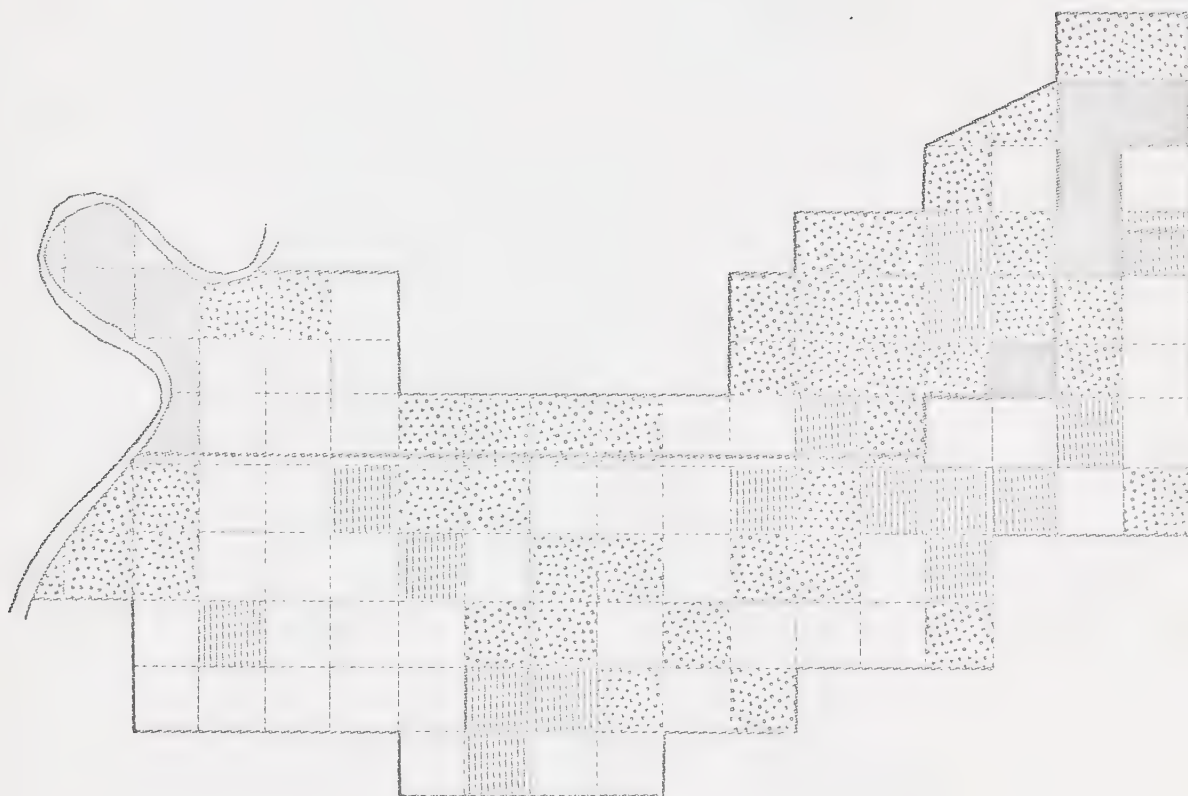







Fig. 25b Strathcona South

RURAL AND URBAN LAND USES

Legend:

-  Agriculture
-  Agriculture plus other land use(s)
-  Industry
-  Other urban land use(s)

-  Timber, unproductive brush and maintained parklands

----- City Boundary

Scale: 1" - 1.5 miles

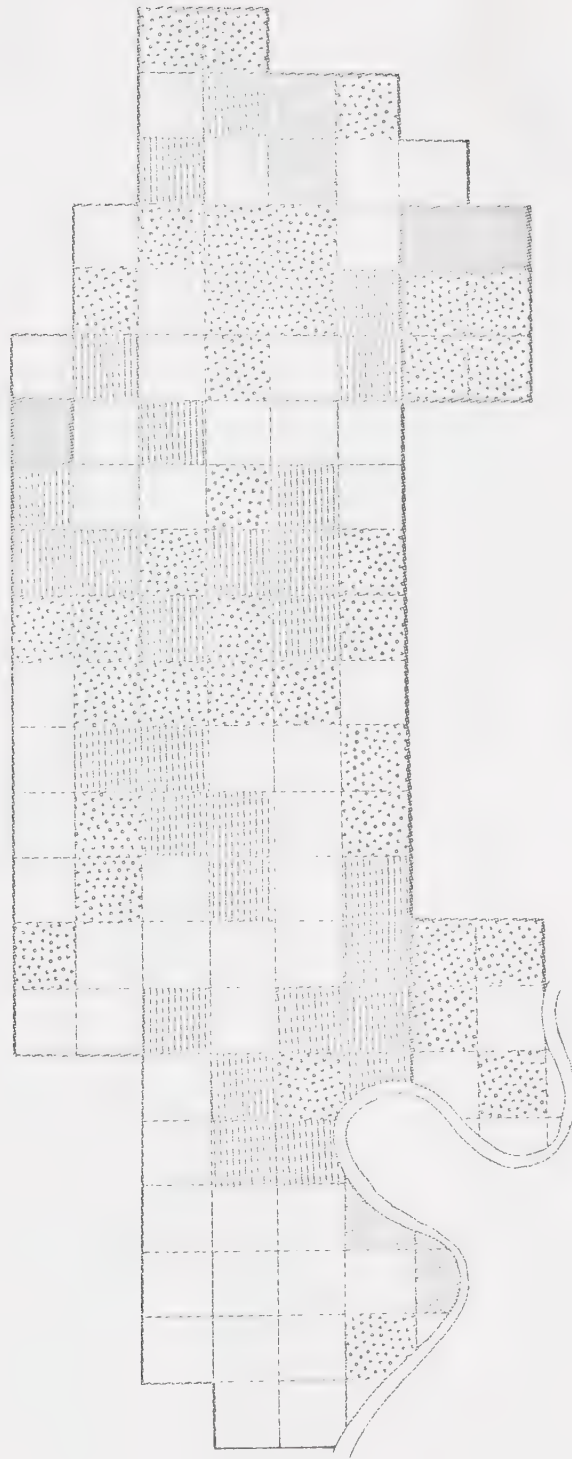






Fig. 25c Stony Plain

RURAL AND URBAN LAND USES

Legend:

-  Agriculture
-  Agriculture plus other land use(s)
-  Industry
-  Other urban land use(s)

-  Timber, unproductive brush and maintained parklands

----- City Boundary

Scale: 1" - 1.5 miles

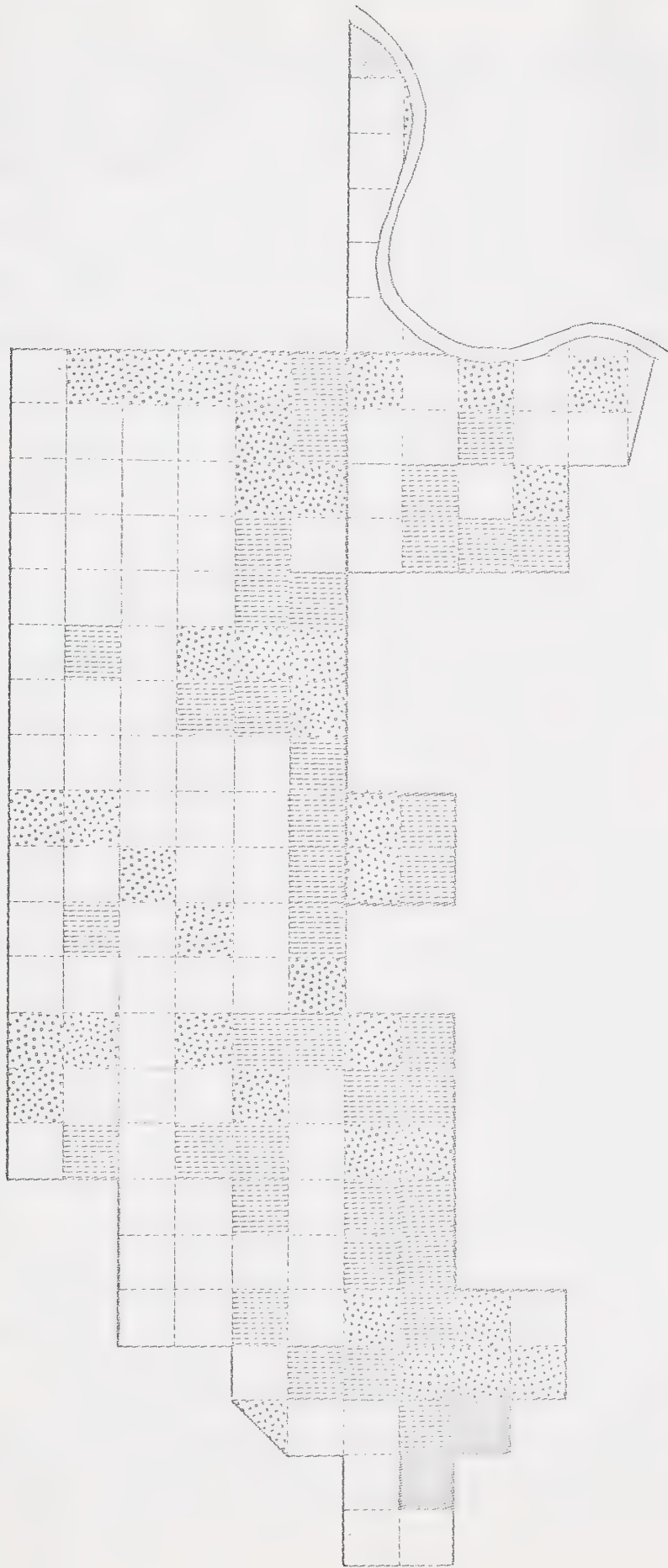




Fig. 25d Sturgeon

RURAL AND URBAN LAND USES

Legend:

-  Agriculture
-  Agriculture plus other land use(s)
-  Industry
-  Other urban land use(s)
-  Timber, unproductive brush and maintained parklands

----- City Boundary

Scale: 1" - 1.5 miles

Rural land uses are represented by Group 1 and urban by Groups 3 and 4. The two remaining categories, Groups 2 and 5, stand for mixed rural and urban land uses, with an assumed average proportion of 50 per cent urban and 50 per cent rural. All non-farm residences, regardless of location, are considered as urban, since to a great extent they are occupied by employees working in the city.

According to Table XVI Sturgeon has a clear dominance with respect to rural land uses, with more than half of the total number of quarter-sections used for strictly agricultural purposes. The corresponding figure for the other three areas is about 40 per cent each. Areas with mixed rural and urban land uses, Groups 2 and 5, are relatively evenly distributed throughout the three fringe zone sub-areas of Strathcona East, Stony Plain and Sturgeon, whereas Strathcona South has a smaller number of quarter-sections in mixed use. The greatest differences in land use pattern among the four areas occur in Group 3. The industrial land uses dominate completely in Strathcona East, 20 of the 111 quarter-sections which constitute this sub-area being devoted to industrial purposes, compared with a total of 10 for the three other areas together. Sturgeon is least industrialized, with industrial land uses dominating in only two of the quarter-sections.

The numbers of units with single or mixed land uses are listed in Group 4. The highest figure for urban land uses is shown in Strathcona South, where 37 per cent of the

TABLE XVI - THE DEGREE OF LAND USE DIVERSITY IN SPECIAL CATEGORIES PER AREA AND
QUARTER-SECTION IN PER CENT OF TOTAL LAND USE

Area	Group 1	Group 2	Group 3	Group 4	Group 5	Total						
	No. of Q.s.	% Q.s.	No. of Q.s.	% Q.s.	No. of Q.s.	% Q.s.						
Strathcona East	47	42	25	23	20	18	16	14	3	3	111	100
Strathcona South	45	41	16	15	5	5	41	37	3	2	110	100
Stony Plain	48	40	27	23	3	3	35	29	6	5	119	100
Sturgeon	83	52	38	24	2	1	36	22	1	1	160	100
Total Fringe Zone	223	45	106	21	30	6	128	25	13	3	500	100

quarter-sections belong to Group 4, as compared with only 14 per cent for Strathcona East (See Appendix II).

Table XVII gives a percentage summary of rural and urban land uses in the rural-urban fringe zone.

TABLE XVII - RURAL AND URBAN LAND USES IN THE RURAL - URBAN FRINGE ZONE OF EDMONTON, PER AREA AND QUARTER-SECTION IN PER CENT OF TOTAL LAND USE

Area	Rural Land Use Emphasis %	Urban Land Use Emphasis %	Total Land Use %
Strathcona East	55	45	100
Strathcona South	50	50	100
Stony Plain	54	46	100
Sturgeon	64	36	100
Fringe Zone Total	56	44	100

The table should be studied in conjunction with Figure 26, which shows the degree of transition towards urbanisation in the fringe zone. The figure is based on Tables XVI and XVII.

With regard to land use the Sturgeon sub-area presents the most rural character of the four. The area's agricultural base is stable, the farms are generally well kept, and few of them are for sale. The zone of transition towards urban land uses is relatively limited, stretching as a narrow band from the inner fringe zone boundary outwards.

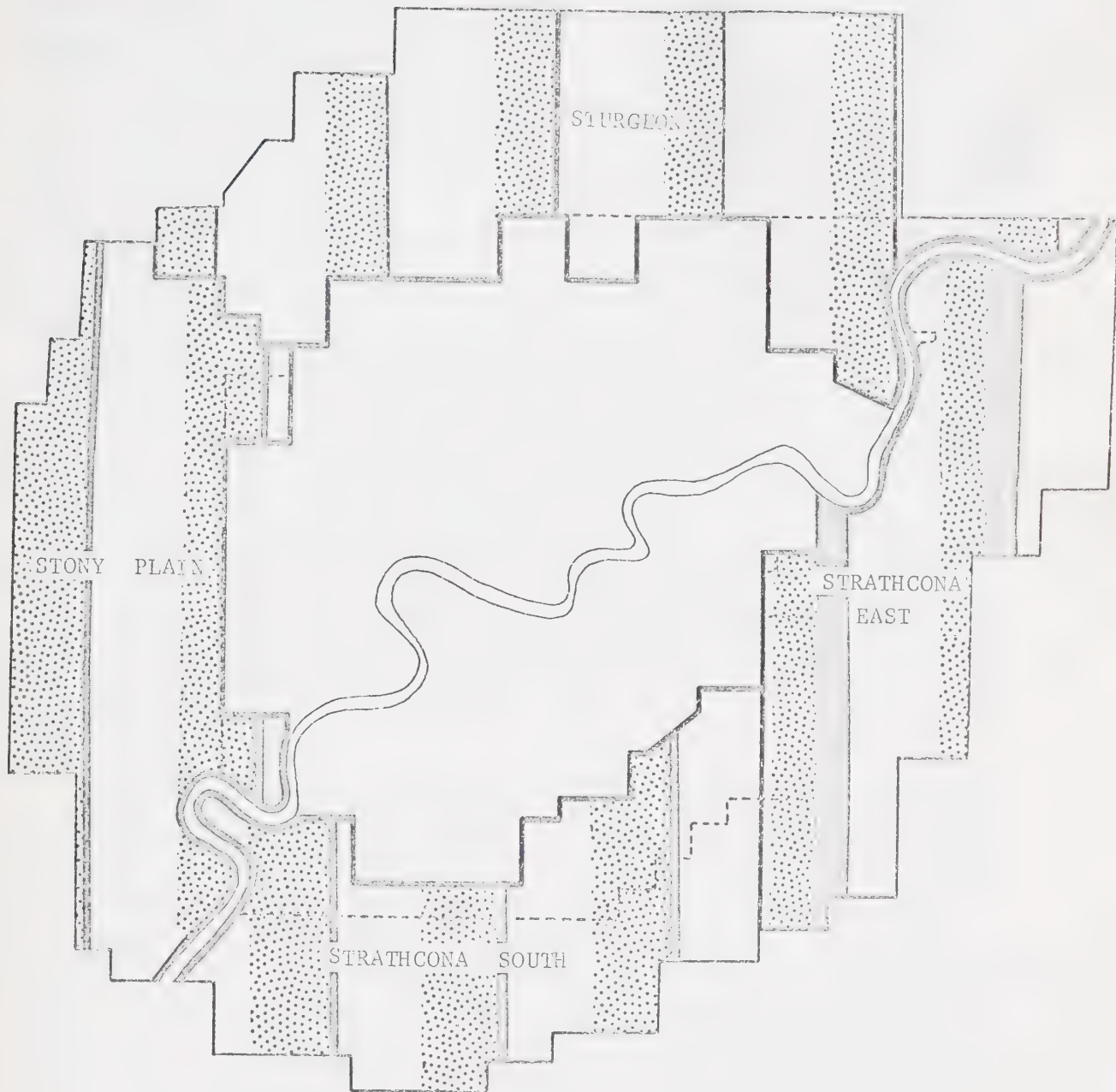


Fig. 26 DEGREE OF TRANSITION TOWARDS URBANISM

Legend:



rural land use
industry
urban land use (except industry)

----- City Boundary

Scale: 1" - 2,3 miles

Great diversity of rural as well as urban land uses occurs within this urbanized area.

Great regional differences occur in the Strathcona East sub-area, and the transitional character of the land use pattern in large sections of this sub-area is easily visualised. The central-northern part of Strathcona East is highly industrialized whereas agriculture dominates in the south. On the whole there is a percentage dominance of rural land uses in the entire fringe sub-area, but especially in the vicinity of the industrialized zone, the farms are usually owned by the big oil companies and rented to the farmers. The few farms which still remain in private ownership are, as a rule, for sale. Big, prosperous farm holdings are found in the southeast.

Stony Plain has a slight dominance of rural land uses as well, and the comparatively big farm holdings are generally found in the outer fringe zone. Transition from rural to urban land uses is taking place preferably in the Alberta Park in the northeast, in West Jasper Place, and along the highways. The visual impact of urbanization is much less in Stony Plain than in Strathcona East, even though these two sub-areas have almost the same percentage distribution of rural and urban land uses.

The highest degree of urbanization has taken place in Strathcona South. This sub-area accounts for an equal distribution of rural and urban land uses. Industrial and commercial development has located along Highway 2 and east of

the highway. Significant residential development is taking place immediately south of the inner fringe zone boundary, in pockets still located within the corporate city limits.

The degree of urbanization in the rural-urban fringe zone of Edmonton has occurred at different rates in the four sub-areas, as indicated above. In the near future, urbanization at an accelerated rate will probably take place in the two fringe sub-areas of the County of Strathcona. This assumption is based on the fact that great parts of these sub-areas are already zoned for various forms of urban expansion.

CHAPTER VI

AGRICULTURAL CHARACTERISTICS IN THE RURAL - URBAN FRINGE ZONE WITH SPECIAL REFERENCES TO THE EDMONTON AREA

Loss of Farmland as a Consequence of Urban Expansion

Inevitably, cities must expand outward from their core into the surrounding countryside or they must grow vertically. For cities in general, the growth up to around 1900 was gradual and limited by the prevailing means of transportation. A rapid urbanization of rural areas near many cities started to take place with the coming of fast transportation facilities. Highways and railways became bordered by commercial and other developments and agricultural areas became more or less encompassed by urban land uses. Residences occupied by employees from the city mushroomed where formerly cattle had grazed and crops had been cultivated. The conversion of good farmland to urban uses has for some time been a matter of great concern. It is obvious that the expansion of cities must take place, for the most part, at the expense of agricultural land. The question arises as to whether it would be possible to canalize urban growth into areas which are less suited for agricultural purposes. Comprehensive zoning regulations could prevent undesirable development

from occurring and thus preserve soils for their optimal uses.

During recent years detailed examinations have been made concerning actual loss of farmland due to urban growth.¹ Probably the best known study in Canada has been undertaken by R.R. Krueger, who investigated the spread of urban land uses on to the Niagara Fruit Belt. He came to the conclusion that an increase of about one million people in that area would be possible without diminishing the fruit production, if only areas less suitable for fruit crops were utilized for settlement. The land preservation would be accomplished only if the municipalities involved were willing to co-operate and thus save one of the most valuable agricultural resources on the continent to the benefit of the cities as well as of the rural municipalities in the region.²

More important than the actual loss of farmland is probably the economic demand of city growth on farming. The impact of non-farm population growth in rural-urban fringe zones causes a rise in land values which in turn affects the level of property taxes; hence farmers are less able to

¹ Examples are D.J. Bogue, Metropolitan Growth and the Conversion of Land to Non-Agricultural Uses. Schripps Foundation for Research in Population Problems, Ohio, 1956; and A.D. Crerar, "The Loss of Farmland in the Metropolitan Regions of Canada". Regional and Resource Planning in Canada, Holt, Rinehart and Winston of Canada, Ltd., Toronto, 1967; and Lower Mainland Regional Planning Board, Urban Sprawl. April, 1956.

² R.R. Krueger, "The Disappearing Niagara Fruit Belt". Regional and Resource Planning in Canada, Holt, Rinehart and Winston of Canada, Ltd., Toronto, 1967.

afford expansion of their operations through purchase of additional land. As a result of the increase in population, the demands for public facilities, such as schools, roads, water, and sewage, grow, and these public expenses have to be covered by increased tax revenues. Investigation shows that farm real estate taxes per acre in metropolitan counties were twice as high as taxes on farms in counties next to metropolitan counties and five times the level of taxes in strictly rural counties in 1960.³ The higher tax burden on farms in the rural-urban fringe zone is due partly to the higher value of farm real estate, which for metropolitan counties averaged about three hundred dollars per acre compared with slightly more than one hundred dollars per acre in non-metropolitan areas in 1959.

The farming situation in rural-urban fringe zones opens the doors for land speculators under a free-enterprise system. The comparatively high prices which are offered by real estate operators, make many farmers willing to sell, especially in areas which during the years have experienced perpetually increasing taxes. Much land is consequently forced out of agriculture before it actually is needed for urban development, and may remain idle for a long time.

Another effect of land speculation outside the city limits is the uncontrolled development of premature, scattered

³ The following short paragraph is a summary from A.D. Waldo, "Farming on the Urban Fringe". Yearbook of Agriculture 1963, United States Department of Agriculture, Washington D.C., p. 139.

subdivisions with insufficient public services. The rural land, instead of gradually "ripening" into urban uses, has been "forced" into urban uses, and becomes frozen there "as an institutional desert".⁴ In the fringe district of Surrey in the Lower Mainland region of British Columbia, speculative subdivision has resulted in 8,500 unoccupied lots under one acre in size by 1954; a number high enough to take care of ten years of population growth.⁵ Zoning by-laws also, for areas outside the corporate city, can restrict such development, but are often hard to enforce in countries based on a private enterprise system. Another possible way to avoid development of premature subdivisions, however, is to demand a complete sanitary system for the area before any loans for purchase are granted.

In spite of urban pressure, however, most farmers prefer to stay on their land and adjust to the new conditions. One way of doing this is by renting or leasing farmland, which is held by speculators for future development. However, this solution of the land problem can only be temporary; the contracts are usually made up on a year-to-year recall basis. Under these circumstances, the agricultural production on that particular land can also be expected to be lower than necessary. Another, and perhaps more common way, is to intensify the farming, and specialize in products which are

⁴ G.S. Wehrwein, "The Rural-Urban Fringe". Econ. Geogr., Vol. 18, July, 1942, p. 224.

⁵ Lower Mainland Regional Planning Board, op. cit., p. 9.

especially perishable, but in demand, and which therefore can only be transported over long distances with difficulty. Such products are, for instance, fruit, vegetables, and flowers. The advantage of ready access to a steady market encourages such a specialization.

But in time, urban development often consumes even the highly specialized farms close to the city. Intensive types of farming, too, need extra workers, at least seasonally, and farm labour is usually both scarce and expensive in urbanized areas. The farmer and perhaps also his family have to work long hours on the farm, in order to make it profitable, and the high wage levels in the city, combined with an eight-hour day for people living within commuting distance of the city, are often hard to overcome. Non-farm incomes of farm families then become increasingly desirable in the rural-urban fringe zone. For instance, by 1959, 24 per cent of all farms in the United States were classified as part-time farm operations.⁶ In the Canadian Census of 1966 a part-time operator is classified as a farmer who receives an income of \$750 or more from work off his holding.⁷ Similarly farmers who receive less than \$750 from off-holding work, but who also work 75 or

⁶ W.M. Crosswhite, "Part-time Farming - Part-time Jobs", Yearbook of Agriculture, 1963, United States Department of Agriculture, Washington, D.C., p. 147.

⁷ In the 1966 Census of Canada a Census-farm is defined as an agricultural holding of one acre or more with sales of agricultural products, during the 12-month period prior to the Census, of \$50 or more.

more days off the holding, are also classified as part-time farm operators.⁸ According to the 1966 Canadian Census data, 16 per cent of the farmers in Alberta were classed as part-time operators. Presumably the majority of them were living close to urban centers.

Part-time farming is usually followed by diminishing utilization of the land, aggravated by an increasing problem of weeds, which may also affect neighbouring farmland. Further, there is an aesthetic side to part-time farming. Due to shortage of time, part-time farmers leave certain fields more or less unimproved; these in time make the area unattractive, especially if the farmer realizes that he can obtain an extra income by allowing advertising firms to erect billboards there. If in these circumstances the only way of keeping the countryside scenically attractive is by farming it, this would perhaps be an argument in support of subsidizing the farmer in order to give the urbanites the opportunity to enjoy rural areas.

The planning policy in the Edmonton area is considered to be well integrated and far-sighted, in comparison with that of most other cities. The need for co-operation concerning land use, roads, utilities, and services between those municipalities that together make up the Metropolitan Area of Edmonton (Figure 14) is partly met through an Edmonton Regional Planning Commission established

⁸ Census of Canada, 1966, Agriculture, p. IX.

in 1950.⁹ A number of objectives and principles of Metropolitan Planning has been stated by the Commission, of which only those parts related to agricultural land uses and zoning will be quoted here.

The Regional Plan distinguishes between three agricultural land use types:¹⁰

- 1) Agricultural-General Urban Reserve,
- 2) Low Density Agricultural Uses, and a
- 3) General Agricultural Zone.

Included in the first group, Agricultural-General Urban Reserve, are

those agricultural lands on the periphery of metropolitan development which, by their relationship to existing land uses, to main road systems and to the established utility systems will, in time, become suitable for general urban use.¹¹

The zoning for General Urban Reserve is also made in order to "prevent premature subdivision and development of land that is prospectively suitable for general urban use".¹²

The second group, Low Density Agricultural Uses, includes land which can be considered to be "natural resources of the area for purposes of primary agricultural production",¹³

⁹ The Metropolitan Area to a great extent coincides with the rural-urban fringe zone of Edmonton as defined in this study. The greatest differences between the two areas are that the City itself, Sherwood Park and the Town of St. Albert are included in the Metropolitan Area but not in the fringe zone.

¹⁰ Summary from City of Edmonton: General Plan, Edmonton, 1967, pp. 26-27.

¹¹ Loc. cit.

¹² Loc. cit.

¹³ Loc. cit.

and which therefore should be reserved for that type of land use. Parts of the Metropolitan Area that are more remote from urban development than those designated as Low Density Agricultural Area are zoned as General Agricultural. This third group takes in land which is of good agricultural standard, and which therefore should remain in farming. In certain cases, subdivisions of "less than 20 acres can be approved without requiring zoning changes by the Commission".¹⁴

The zoning principles in the Regional Plan serve as a valuable guide for present and future development within the Edmonton Metropolitan Area, and thus also for the main part of the defined rural-urban fringe.

In cases where the present agricultural land is reserved for urban development the land is usually bought up by the City's authorities or by speculators, and is later rented or leased to farmers. It is nevertheless remarkable how much land actually is still advertised for sale for industrial or other forms of development, although the area is zoned for strictly agricultural uses - a fact which to a certain extent indicates that the zoning regulations are being changed fairly easily.

In the northeast, there is a part of the fringe zone within the City boundary which is zoned for light industrial and residential development. Most land is owned by others than the people who farm it, and great parts of the district

¹⁴ Loc. cit.

remain under agricultural use. The same situation occurs in many places outside the City limits, as for instance in the southwestern part of the Strathcona South sub-area and in West Jasper Place. Along the City border in the southeast and east, the land is zoned for industrial development. This may explain the fact that many abandoned farms are to be found there. Low Density Agricultural and General Agricultural Zones occur mainly in the outer fringe zone. The prices of land are considerably higher in areas zoned for General Urban Reserve than in the Agricultural Zone. At present the most expensive land for residential development is found along the southwestern City border, where the current price averages around \$14,000 per acre.¹⁵ Land for industrial and commercial uses within the zoned areas reaches almost the same price level, variations which occur being connected with site factors and accessibility to roads and railways. In other parts of the rural-urban zone the price per acre for land which is going to be used for purposes other than agriculture reaches about \$7,000 per acre.

As shown above, there are great variations with regard to prices per acre in different parts of the fringe zone. The acre price for land also varies considerably with the distance from the City. This will be discussed later in the chapter. Table XVIII shows the approximate

¹⁵ Information concerning land prices was gathered from Real Estate Companies and from interviews with people living in the areas concerned.

price level on agricultural land in the four districts of the fringe zone. During interviews, farmers were asked to appreciate the value of their land five years ago. The figures in the table have to be considered as subjective judgments, but most farmers seemed to be fully aware of the economic game which is taking place with land in the fringe zone. One remarkable exception appeared; a young farmer frankly declared that his land probably was worth "at least 100 dollars per acre". It should be added that his 50-acre farm is located close to the industrial area in the north-eastern fringe and near the City border! No consideration was taken of his statement for the purpose of the table, since he appears to be far off the mark.

TABLE XVIII - APPROXIMATE VALUE PER ACRE OF AGRICULTURAL LAND
IN THE RURAL-URBAN FRINGE ZONE BETWEEN 1964 AND 1968

Sub-Area	1964	1968	Increase	Increase in Per Cent
Strathcona East	700	1,100	400	57
Strathcona South	1,400	1,800	400	29
Stony Plain	1,000	1,700	700	70
Sturgeon	900	1,600	700	78
Total Fringe Zone (Average value)	1,000	1,600	600	60

The figures regarding current land values are the most reliable available. Most people seemed to have rather vague ideas of how much the value of the land has increased over

the past five years. According to the table great increases have occurred in Sturgeon, Stony Plain, and Strathcona East. The prices of land in Strathcona South were comparatively high already in 1964, and the percentage increase between 1964 and 1968 was not appreciated to be higher than 29 per cent. The generally higher land prices for both 1964 and 1968 in Strathcona South can be explained by the fact that the main growth of the City has occurred in the south during recent years, which already has been discussed in Chapter I. An average increase in land value of 60 per cent in the total rural-urban fringe zone appears to have occurred.

The figures in Table XVIII on current land values diverge considerably from those given on Page 109. It should be kept in mind that land values presented in the table are average acre prices for a whole farm holding. Many of the farmers interviewed thought it more likely possible to sell a smaller portion of the farmland at a much higher price, depending upon the location in relation to areas of fastest growing urban development. The approximate value of farmland in Strathcona East is surprisingly low, 1,100 dollars per acre as compared with an average of 1,700 dollars per acre for the three other fringe zone areas. It may seem paradoxical that this, being the most industrialized of the four fringe sub-areas, has by far the lowest acre values of land. As an explanation it may be restated that the prices of land vary considerably with the distance from the City. Information from two of the biggest Real Estate Companies¹⁶ in

¹⁶ Privileged sources: not for publication.

Edmonton showed that the present land prices are almost twice as high along the City border as within a zone located only three to five miles outwards from the same boundary. Average figures of about one thousand dollars per acre were mentioned for agricultural land in that outer zone.¹⁷ As for Strathcona East, the absolute majority of returned questionnaires came from farms located in the outer fringe zone and corroborating information proved hard to obtain since most of the farmland closer to the City or in the industrial zone was leased, and the temporary operators were generally unwilling or unable to estimate the value of the land.

The highest price level on land is reached in Strathcona South, which to a great extent is a consequence of the rapidly expanding residential development which takes place in the inner part of a rural-urban fringe zone. Comparatively low estimations of current land values appeared in the fringe portion of Sturgeon. This may be expected, since the area is generally officially zoned for strictly agricultural uses. Great differences were noted with regard to the distance from the inner fringe boundary. Farmland within the corporate city has recently been bought for 7,000 dollars per acre by the city authorities, whereas several farmers in the outer fringe zone estimated the current value at about three hundred dollars per acre.

¹⁷ Good agricultural land, beyond areas with undeniable urban influence, is generally sold for 80 to 150 dollars per acre in the more central parts of Alberta. The prices vary considerably however depending upon accessibility and quality of communication routes.

Of the total persons questioned as to what could be regarded as the main cause for the changing land value, 85 per cent of the farmers in the rural-urban fringe zone referred to the expansion of the City of Edmonton as creating an increased demand for land. Five farm operators, whose land holdings were all located in the outer fringe zone, expressed the opinion that there was no direct urban influence in their area yet, such as could affect the prices of their land. Their estimations of current value of the land were very low, between 100 and 300 dollars per acre, and the increase in land value which had occurred during the past five years was regarded as being due more to general inflation than to land speculation. Three farmers answered that they had made considerable improvements on the farm during the past five years, and this had increased the value of their holding. Also in these three cases the farms were located in the outer fringe zone, between three and three and a half miles from the inner fringe boundary. Only one farm operator assumed that the improved communication system in his area had caused the rising prices of agricultural land.

Public Services and a Mill Rate Statement

Public services in a community include schools, health care facilities and general municipal services, such as roads, water, sewage, and fire protection, to name the most costly ones. In order to cover the expenses for the mentioned public services, a mill rate is often decided upon by the legislative body of the community and is based upon the total

revenue needs of the same community. Every individual property owner pays taxes in relation to the assessed value of his property, and the mill rate statement tells how many dollars per thousand dollars of assessed property value one is expected to pay in the form of taxes to the community.

The first settlement in the fringe zone is usually motivated by reasons such as cheaper land, lower taxes, and healthier environment as compared with city living. The first settler knows that he cannot expect many public services and utilities; he drills his own well and sends his children to the small rural school. Nevertheless, the first home-builder in the fringe zone soon finds himself surrounded by others who have decided to settle there for the same reasons as he did. Houses consequently grow up haphazardly, due to the lack of inspection and building restrictions, and each gradually finds that he is living in an urban environment, without the benefits and services of urban governments. The greatest concern usually becomes the lack of modern schools with well-trained teachers. In order to supply various public services, it becomes necessary to raise the property tax level considerably. In time the fringe zone settler may end up paying higher property taxes than the City dweller, since the fixed price of the various public services in the fringe zone communities have to be covered by a comparatively low number of tax payers.

Table XIX shows the mill rate statements for the City of Edmonton and surrounding fringe zone municipalities in

TABLE XIX - MILL RATE STATEMENT FOR THE CITY OF EDMONTON AND SURROUNDING FRINGE ZONE
MUNICIPALITIES, 1958 AND 1967

Area	Mill Rates						Increase/ Decrease Mills	Increase/ Decrease %
	Municipal 1958 1967	School 1958 1967	Hospital 1958 1967	Total 1958 1967				
City of Edmonton	17 13	36 34	5 6	58 53	-5	-9		
Municipal District of Strathcona *	18 16	19 37	4 5	41 58	+17	+41		
Municipal District of Stony Plain	26 24	29 33	4 5	59 62	+3	+5		
Municipal District of Sturgeon	18 16	34 39	3 7	55 62	+7	+13		

Source: Annual Reports of the Department of Municipal Affairs of the
Province of Alberta, Edmonton, 1960 and 1969

* In 1962, the Municipal District of Strathcona became the County
of Strathcona.

the two years 1958 and 1967. It should be pointed out that the figures are not exactly comparable, since the assessments have been made with various time intervals in the different communities. Also there are variations between the communities in the degree to which buildings and improvements are taxed and in ways land values are determined and industrial property assessed. In the year of 1967, the total mill rate was lower in the City of Edmonton than in the less urbanized communities of Strathcona, Stony Plain, and Sturgeon. It will be noted that the rate has decreased by five mills (9 per cent) between 1958 and 1967 in the City, whereas in the other three areas, it has increased. The greatest increase over this ten-year period occurred in the district of Strathcona, where the mill rate increased by 17 units (41 per cent), mainly due to the change of status from Municipal District to County. Under the latter status, the community has full responsibility for all costs in connection with its school system. In spite of the great increase, the mill rate is comparatively low in Strathcona, which is the result of the numerous tax-paying industries which are located within that County. As shown in the table, the costs for schools are without comparison the greatest expenses for the communities.¹⁸

¹⁸ The school enrolment in the City of Edmonton was in 1966 25 per cent of the population, compared with an average of 30 per cent for the rural communities. In 1966, the City of Edmonton accounted for 92.6 per cent of the total enrolment in the greater metropolitan area as Proposed by E.J. Hanson (See Chapter I). By 1981, the projections indicate that the City's portion would decrease to 85 per cent with the tendency of large families to migrate to the outer areas. E.J. Hanson, The Potential Unification of the Edmonton Metropolitan Area - A Fiscal Study. Edmonton, 1968, pp. 181 and 186.

The costs for hospital and general health care are low compared with municipal and school expenses, but the trend has been upwards for all areas between 1958 and 1967. The total costs for the diverse public services which are included in municipal expenses required fewer mills in order to be covered in 1967 than in 1958. This suggests that the assessed land values increased during the period, since the costs for the same period in reality went up.

With regard to public services, the two items, water and sewage, were chosen as examples of utilities usually supplied by municipalities, at least in cities, and paid for by tax revenues. The result of the writer's investigations of these utilities is illustrated in Table XX. The table is based exclusively upon findings from interviews with farmers in the rural-urban fringe zone of Edmonton.

According to Table XX, most of the farm holdings in the fringe zone have their own wells. Only two farmers of the

TABLE XX - ARRANGEMENTS FOR WATER SUPPLY AND SEWAGE DISPOSAL
IN THE RURAL - URBAN FRINGE ZONE

<u>Water Supply to Fringe Residences</u>	Number of Residences				Total Fringe
	Strath. East	Strath. South	Stony Plain	Sturgeon	
By water line from City of Edmonton	0	0	0	2	2
By local service	0	3	1	2	6
By own well	15	9	13	22	59
By other means	0	0	2	1	3
Total Fringe Zone	15	12	16	27	70
<u>Sewage Disposal</u>					
By sewer line from City of Edmonton	0	0	0	3	3
By local service	0	0	0	0	0
By own septic tank	14	8	12	19	53
By other means	1	4	4	5	14
Total Fringe Zone	15	12	16	27	70

total number of seventy who answered this question, remarked that their water needs were supplied by water line from the City. Of these two farms, one is situated within and the other half a mile outside the City boundary. In six cases the local municipality provides water lines to the farms, whereas three farmers answered that their only possibility to get water to their holdings was by hauling it by truck

from the City.

Also regarding sewage, most farmers in the rural-urban fringe zone have to solve the problem themselves. Only three farms in the entire area are connected with the sewer line from the City. The local lines do not seem to service the farm population. Fourteen of the seventy farms are not modernized in the sense that they retain indoor sewage facilities.

Some Economic Aspects of the Farming Situation

The farmers in the rural-urban fringe zone of Edmonton must of course adjust to the changing economic situation in the area which surrounds the expanding city. First of all, many do not even try to cope with the new conditions; they try to sell their holdings at a good profit. For example, in the summer of 1967, 25 per cent (eighteen farm holdings) of the seventy farms visited in the study area were for sale. Another thirteen farmers were willing to sell part of their farmland if offered a "good price". A majority of farm operators said that they liked the location of the farm, but still many were prepared to sell and move, because of high land values with the consequent possibility of making a profit by selling. Only five farmers disliked the location of their holdings, remarking that it was too close to the City. In some cases there was complaint about fast-increasing property taxes, especially in the Sturgeon sub-area. Here several farmers expressed the opinion that the Municipality should try to encourage industrial development to a much greater extent than was the case, in order to increase the

income base in the community.

Three steps of agricultural adjustment to the increasing urban influence are discernible: renting or leasing additional land, intensification, and part-time farming. In the rural-urban zone of Edmonton, many examples of the above economic compromises in agriculture were found. Forty-four per cent of the total number of interviewed farm-owners rented additional land in the fringe zone; most of the lots varied between 70 and 155 acres in size. Larger farm units and a great degree of mechanization were considered to be necessary in order to survive the urban pressure.

Intensification of farming, which in most cases has meant a complete change of farm production, has become a consequence of higher taxation and generally higher costs of living in the rural-urban zone around Edmonton. Every third farm has undergone a more or less complete change in farming practices during the last five years. Generally the form of specialization has been towards a single-farm product such as beef, dairy, poultry, or horticulture (See Appendix III). Utilization of more efficient farm machinery and greater use of fertilizers have also been pointed out as recent changes in farm practices. This is one of the positive effects of the urban pressure.

Part-time or spare-time farming is common in the fringe zone around Edmonton (Table XXI).¹⁹ Though the majority of

¹⁹ In cases where the farm-operator works full-time off the farm, but still has some income from the farm holding, the term spare-time farming is used.

TABLE XXI - PER CENT OF TOTAL INCOME FROM AGRICULTURE IN THE RURAL-URBAN
FRINGE ZONE OF EDMONTON

Per Cent of Income from Agriculture	Strathcona East		Strathcona South		Stony Plain		Sturgeon		Total Rural- Urban Fringe Zone	
	No. of Farms	% Farms	No. of Farms	% Farms	No. of Farms	% Farms	No. of Farms	% Farms	No. of Farms	% Farms
Less than 10 %	2	13	3	23	2	13	1	4	8	12
10% but less than 50%	3	20	3	23	6	40	1	4	13	19
50% but less than 90%	1	7	1	8	1	7	4	17	7	10
More than 90%	9	60	6	46	6	40	18	75	39	59
Total	15	100	13	100	15	100	24	100	67	100

farmers in the rural-urban zone obtain more than 90 per cent of their income from farming, a considerable number of operators have off-farm income sources as a complement to farming.²⁰ The total figures for the whole fringe zone show that for 12 per cent of the farm population the work on the land provides less than 10 per cent of the total income, and several farmers in this group admit that they farm mainly for relaxation. For many part-time and spare-time operators, the farm gives a feeling of security. They keep the land in order to have a potential income source to fall back on in case of difficulties in obtaining off-farm employment. Great differences occur within the four sub-areas. Thus no less than 75 per cent of the operators in the Sturgeon sub-area are full-time farmers or farm workers, as compared with the low number of 40 per cent in Stony Plain and 46 per cent in Strathcona South. Only 8 per cent of the farm operators in the Sturgeon sub-area derive less than 50 per cent of their total income from agriculture. The corresponding figure for Strathcona East is 33 per cent, for Strathcona South 46 per cent and for Stony Plain 53 per cent.²¹ That form of agricultural adjustment to the increasing urban pressure, as shown by the high numbers of part-time and spare-time farmers, thus most frequently occurs in the Stony Plain and Strathcona South fringe sub-areas. This might indicate that the urban

²⁰ According to Table XXI, about 39 per cent of the farmers in the rural-urban fringe zone of Edmonton are part-time operators, as compared with 16 per cent for the whole province of Alberta (See Page 106).

²¹ These conclusions have only a limited reliability, since the sample is small, as shown in Table XXI.

pressure, is for the present higher than in the other two sub-areas of the fringe zone.

In this study of agriculture in the fringe area, it was found that five years was the average length of time spent in part-time or spare-time farming. Especially spare-time farming has increased considerably during the past three years. One farmer has been a part-time operator on a relatively big farm for sixteen years, during which period his wife has had the main responsibility for the management of the farm. Only 20 per cent of the farmers who answered this question were actually part-time farmers; the rest had full-time, non-farm employment, most of them in the City of Edmonton. All part-time and spare-time farmers in the fringe area owned cars, and each one commuted on an average of 11 miles per day between home and place of work.

If, for economic or other reasons, it should be necessary to move from the present location, 40 per cent of the farm operators would prefer to move to another farming district near Edmonton. Another 15 per cent were eager to remain in farming, but in an area more remote from the City. About 30 per cent were willing to give up farming completely and work in the City of Edmonton or in a small town close to Edmonton. The remaining 15 per cent of the farmers in the rural-urban fringe zone had no special preferences concerning the eventual future place of living.

Many of the farmers interviewed thought that part-time and spare-time farming will continue to provide a temporary

stage in the process of adjusting to the changing economic situation in the rural-urban fringe zone. However, as already many of the examples from the Edmonton area indicate, these types of farming will probably, in the future, play a diminishing role as a source of family income. The actual farming will most likely be carried out mainly for the purpose of relaxation from full-time, off-farm employment. On the other hand, the farm operators in the fringe zone who are willing to carry out farming on a full-time basis, can at least temporarily do so by increasing their acreage by renting or leasing additional land from these part-time holdings.

CHAPTER VII

DEVELOPMENT OF AN AGRICULTURAL LAND USE PATTERN: ANALYSIS AND CONCLUSION

The distance to the market often influences the utilization pattern of agricultural land. Thus two areas, having similar production capability but located differently with respect to an expanding urban area, usually do not turn out the same products. This fact is established also in the agricultural land use pattern in the Edmonton area. The factors which affect agricultural land use in the rural-urban fringe zone are complex and difficult to analyze, due to the dynamic character of the rural-urban relationship. Transportation costs in relation to the value of the product have, through time, been pointed out as a key factor, but there is no doubt that the actual transportation costs play a relatively subordinate role within the rural-urban fringe zone. Influences on the agricultural land-use pattern in different parts of the fringe zone area are exerted more by variations in land values and the associated differences in property taxes than by variations in transportation costs, even though the latter still play a certain role.

In order to develop a framework for further discussion, von Thünen's concepts of Der Isolierte Stadt will be referred to. In his work, published as early as 1826, the economist dealt with land utilization patterns around an urban

center.¹ His model starts with a series of concentric land use zones surrounding a central city. The model assumes 1) rational behavior, 2) an isolated state, 3) one central city, 4) a village type of settlement, 5) uniform topography, 6) uniform fertility and climate, and 7) relatively primitive transportation facilities with all products being carried by man, hauled by horses or oxen, or transported under their own power.²

The agricultural land-use pattern which develops around this central city is a result of competition between different uses. Von Thünen called the controlling factor for this competition Economic Rent, which is defined as the return from investment in land. Those pieces of land which could provide the highest Economic Rent would also be the most demanded. In von Thünen's land utilization scheme, transportation costs were a primary factor; increasing transportation costs led to lower Economic Rent and vice versa. Therefore, Economic Rent can be expressed as a function of

¹ Reproductions of von Thünen's agricultural land-use pattern appear in many writings of geographical and economic matter. For this study the following books and articles have been used: M. Chisholm, Rural Settlement and Land Use. Hutchinson University Library, London, 1968, pp. 20-32; R.T. Ely and G.S. Wehrwein, Land Economics, The Macmillan Company, New York, 1940, pp. 60-70; R. Barlowe, Land Resource Economics, Prentice Hall, Inc., Englewood Cliffs, 1958, pp. 249-260; A. Grotewold, "Von Thünen in Retrospect". Economic Geography, Vol. 35, 1959, pp. 346-355; and R. Sinclair, "Von Thünen and Urban Sprawl", A.A.A.G., Vol. 57, March, 1967, pp. 72-87.

² R. Barlowe, Land Resource Economics. op. cit., p. 250.

distance from the market, as illustrated in Fig. 27a.³

O symbolizes the central city market, K is the distance between the land and that market and R is the level of Economic Rent. Thus, with regard to the figure, an increase in K results in a decrease of R, until a point X is reached at which the Economic Rent is entirely absorbed.

However, there is in most cases a competition between land uses, each of which therefore has a different R-slope. Fig. 27b shows a model for two competing uses.

Land Use 1 yields a higher Economic Rent close to the market, but its rent decreases very rapidly with increasing distance from the market. Its advantage ceases at point Z, after which point Land Use 2 gives a higher rent, until point X is reached, at which the Economic Rent ceases too.

Under von Thünen's thesis commodities which yielded a high Economic Rent close to the market were bulky products, such as root crops and firewood. The latter was in von Thünen's time used as fuel and also as building material, and had to be transported to the market by wagon. Due to high transportation costs the relative value of these products decreased rapidly with the distance from the central city market. Land Use 1 in Fig. 27b also includes all kinds of perishables, such as milk, eggs, berries and

³ Figs. 27a, 27b and 28 are taken from Robert Sinclair's article "von Thünen and Urban Sprawl", pp. 74 and 77. Some small changes have been made in Fig. 28.

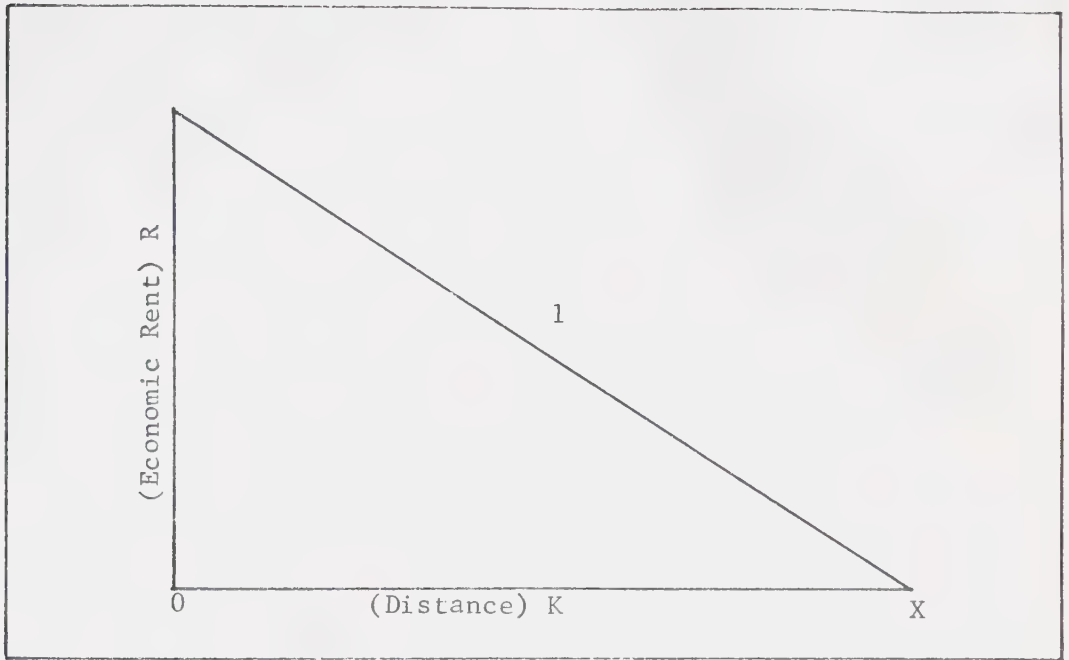


Fig. 27a Relationship of Economic Rent and Distance from Market
Source: "von Thünen and Urban Sprawl", by R Sinclair

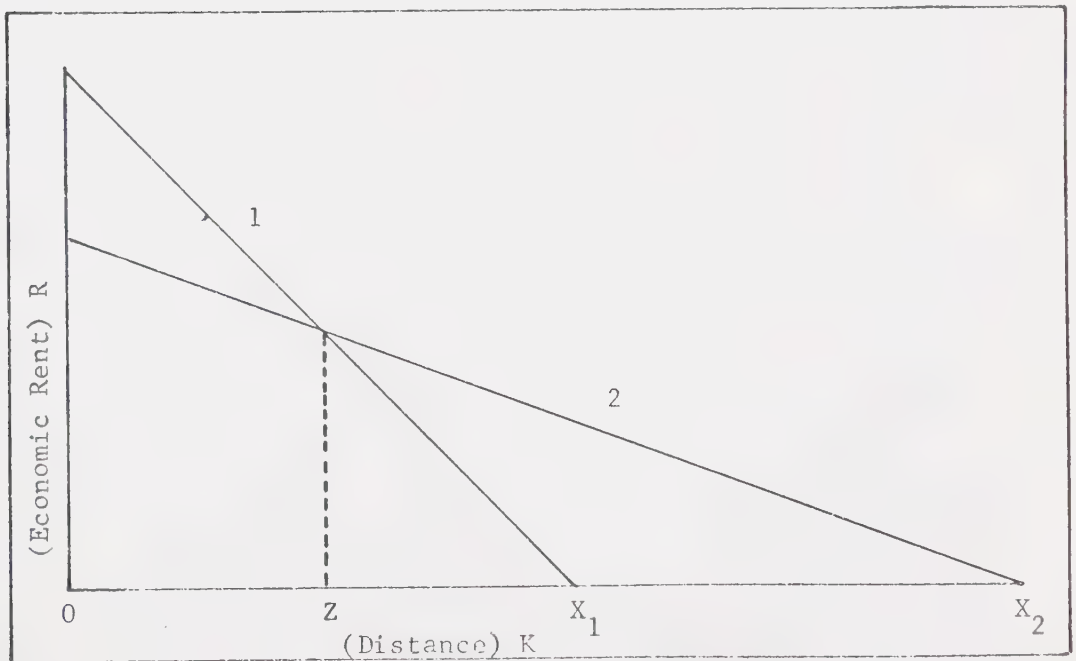


Fig. 27b Relationship of Economic Rent and Distance from Market
for two competing land uses
Source: "von Thünen and Urban Sprawl", by R Sinclair

flowers which could not then be transported longer distances by the means of transportation existing at the time. Land Use 2 in the same diagram includes products of lower bulk per hectare, such as grain, which can be transported comparatively cheaply but which do not yield the same high Economic Rent close to the market.

Fig. 27b represents, apart from land use competition, different methods of growing the same crop (perishable products excluded here for understandable reasons). Land Use 1 then stands for an intensive growing system with high input of machinery, labor and fertilizers, which is profitable close to the market, since the higher production pays off in higher Economic Rent. The transportation costs are comparatively higher when intensive growing methods are used, since not only the finished products, but also extra workers and fertilizing material have to be transported, a fact which makes intensive land use less feasible further out from the central market. Hence, in the first zone (Fig. 27b, distance O-Z), intensive crop rotation would be preferred, whereas a less intensive rotation with fallow land might be better in Zone 2 (Fig. 27b, distance Z-X).

These are in summary the principles behind von Thünen's land use scheme. With O, the central city market, as center he constructed concentric zones for agricultural land uses of decreasing intensity (Fig. 28). In the first zone high-priced and perishable products such as milk, eggs and vegetables were produced, since no other land uses

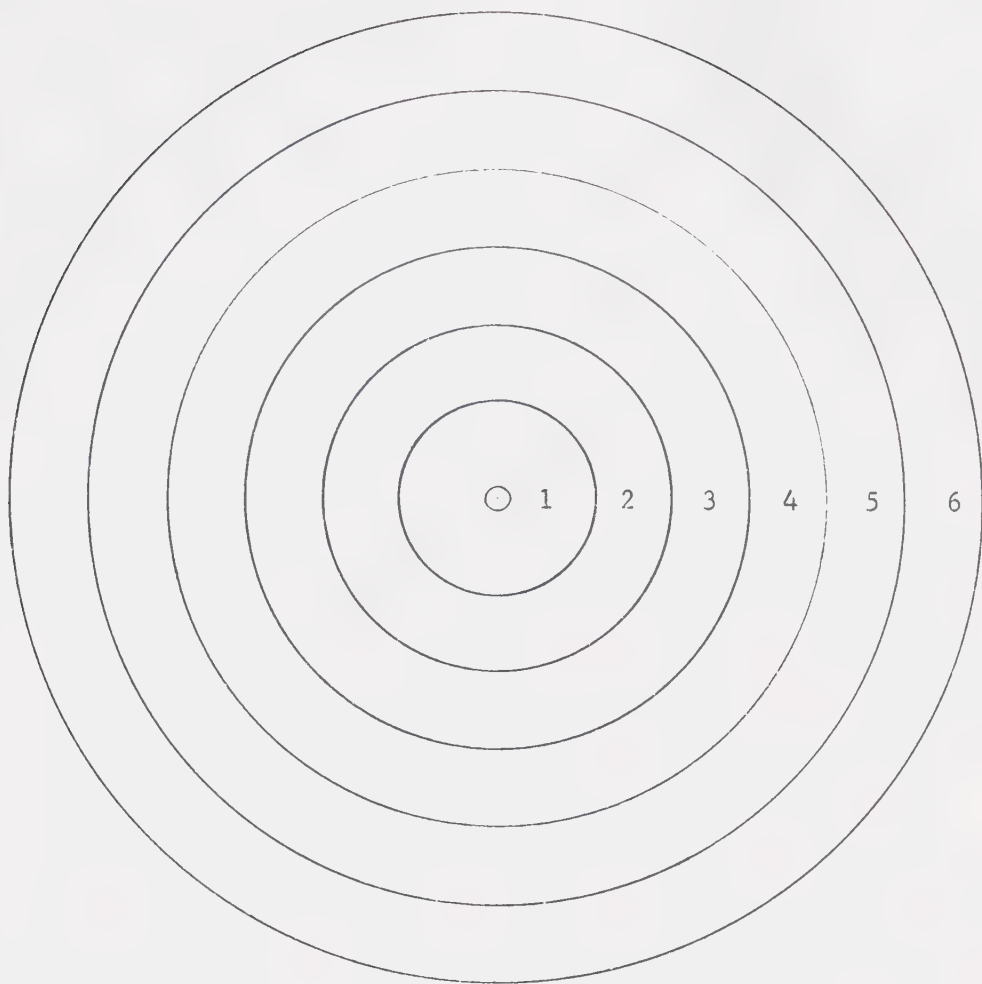


Fig. 28 Sequence of land uses in Der Isolierte Staat

- Zone 1 Market Gardening and Fresh Milk
- Zone 2 Firewood and Lumber
- Zone 3 Intensive Cropfarming (Root-crop)
- Zone 4 Cropfarming (with Fallow and Pasture)
- Zone 5 Three-field Rotation
- Zone 6 Grazing

Source: R Sinclair, "von Thünen and Urban Sprawl"

yielded a higher Economic Rent. The second zone was devoted to firewood and lumber, which are bulky and costly to transport, and therefore had to be grown close to the market. The land beyond these two zones became gradually less intensively farmed; bulky products of high keeping quality like root crops occupied large parts of the third zone, fallow and pasture appeared in the fourth, and in the last of the three crop-farming zones a three-field rotation system was practised. The sixth zone was exclusively devoted to extensive grazing, since the distance to the central city market would make crop-growing for sale unprofitable.

No transition zone between rural and urban land uses occurs in von Thünen's over-simplified scheme of land utilization, and thus there is no rural-urban fringe zone as we know it today. Still there are several similarities between von Thünen's agricultural land use scheme and the land use pattern which develops around a modern city. The determining force behind von Thünen's land use model was the relationship between transportation costs and distance to market, whereas nowadays refrigeration techniques and modern means of transportation to a great extent have changed the assumptions on which the whole concept of Economic Rent was based. But resemblances remain, indicating that there must be other factors besides transportation costs which cause the characteristic agricultural land utilization pattern in the rural-urban fringe zone.

This chapter will try to analyze the agricultural land-use pattern around the City of Edmonton and finally to summarize the findings regarding economic factors behind modern rural-urban fringe zone farming as compared with those prevailing during von Thünen's time.

Agricultural Land-use Patterns in the Rural-Urban Fringe Zone of Edmonton

The Edmonton area⁴ satisfies some of the assumptions in von Thünen's model. The City is the center of an agricultural district with a relatively uniform topography. The soils are generally of good quality for agricultural purposes, and the climate can be presumed to be uniform. Public transportation facilities in the form of roads and railroads are rather evenly distributed throughout the whole area, even though the actual means of transportation are different. If there is any conformity at all between von Thünen's land utilization model and the land-use pattern in the rural-urban fringe zone of Edmonton, it is obvious that a great part of the fringe zone must fall within the most intensively farmed belts of the model. Farm size in the fringe zone is closely related to the type of farming and, with the intensive farming such as market gardening and poultry farming, it usually comprises relatively small holdings, a fact that has been stated by von Thünen and several other

⁴ The Edmonton area includes here the City of Edmonton and the surrounding rural-urban fringe zone.

writers.⁵ Consequently, to establish any eventual connection between von Thünen's model and land use in the rural-urban fringe zone of Edmonton, the first factor to be investigated will attempt to ascertain whether the farms in the Edmonton rural-urban fringe zone are generally smaller and more intensively farmed than the average for Census Division No. 11.⁶

In order to obtain further information with regard to the agricultural land-use pattern, an additional thirty-nine farmers in the rural-urban fringe zone were interviewed in accordance with a written questionnaire. The questions included size of farm holding, distance from the farm to the inner fringe zone boundary, farm classification and production, transportation means for farm products, to mention some of the more important ones.⁷

Table XXII shows how the 105 farms from which information was obtained were distributed with regard to size. Most farms in the rural-urban fringe zone as well as in Census Division No. 11 are between 70 and 239 acres in size;

⁵ For instance, M. Chisholm has a brief discussion in his book Rural Settlement and Land Use, about the type of farming and the optimum areal extent of farm holdings, in which it is established that small farms often are connected with an intensive use of land.

⁶ When possible, Census Division No. 11 (C.D. 11), which includes the entire municipalities of Stony Plain, Sturgeon, and Strathcona and some others will be used for comparative purposes rather than the whole Province of Alberta.

⁷ As pointed out in the Introduction, some questions and classification schemes are identical to those used by the Dominion Bureau of Statistics in their Agricultural Census of Alberta (1966) and have been used in order to make a comparison possible

TABLE XXII - NUMBER AND PER CENT OF FARMS PER SIZE GROUP
IN THE RURAL-URBAN FRINGE ZONE COMPARED WITH PERCENTAGE
DISTRIBUTION PER GROUP IN C.D. 11

Farm Size in Acres	Number of Fringe Zone Farms	% per Group, Fringe Farms	% per Group, Total Number of Farms in C.D. 11 *
1 - 9	4	4	3
10 - 69	30	29	6
70 - 239	40	38	33
240 - 399	15	14	29
400 & more	16	15	29
Total	105	100	100

* Source: 1966 Census of Canada, Agriculture, Alberta

38 and 33 per cent respectively. Still the differences are striking. 33 per cent of the farm holdings in the fringe zone are smaller than 70 acres, compared with only 9 per cent of the total number of farms in C.D. 11. There are also relatively few really big farms in the fringe zone, where only 15 per cent belong to the largest size group, whereas 29 per cent of the farms in the whole Census Division are bigger than 400 acres. In summary, with regard to size, the farms in the rural-urban fringe zone are on average considerably smaller than those of the entire Census Division 11. It now remains to be established whether or not a fringe zone farm is generally more intensively farmed than an average farm in the total area

included in Census Division 11. The significance of the term "intensive farming" has already been explained (p. 128, a high input of labor, and/or machinery, and/or fertilizers per unit of land). For the purpose of this study no attempt has been made to extract an exact measure of farming intensity in terms of input per unit, since factual information is hard to obtain. Farming intensity ratios arrived at here are based entirely upon annual input of labor per acre of farm land, since these data were considered to be most reliable and also easiest to collect.⁸ However, it should be understood fully that they represent only one aspect of farming intensity, although probably the most decisive one. Each farm has been assumed to have one permanent, full-time (260 days/year) person in charge of the farming, except in those cases where it has been declared that the farm holding is operated only on a part-time basis. Only 66 of the interviewed farm operators provided answers detailed enough for the basis of farming intensity calculations. Due to the low number of answers no attempt has been made to find characteristic agricultural patterns in the various parts of the fringe zone.

Table XXIII shows the various types of farming obtaining in the rural-urban fringe zone of Edmonton, along

⁸ Interviewed farmers were asked to list total hired employees into the following groups: full time - year round, part time - year round, full time - seasonal, and part time - seasonal; and to tell the number of work-days per year for all categories other than "full time - year round".

TABLE XXIII - TYPES OF FARMING, ACCORDING TO FARMING
INTENSITY IN THE RURAL-URBAN FRINGE ZONE OF EDMONTON

Type of Farming	No. of Farms	Ave. Size, acres	Average Labor, Days/Year/Farm	Farming Intensity, Work-days/Acre
Market Gardening	2	13	1,170	90
Fur	1	5	260	52
Hog	2	40	772	19.3
Poultry	3	70	924	13.2
Stables	2	135	567	4.2
Sod Production	1	320	800	2.5
Dairy	7	310	682	2.2
Mixed	26	385	770	2.0
Cattle	5	270	405	1.5
Grain	17	570	513	0.9
Total	66			

with their intensity ratio. The farming intensity varies very much between different types of farm operations and also with different sizes of farm holdings. Market gardening, fur, hog, and poultry farming form a group of especially high intensity, with generally smaller farm holdings. They can be considered to have a relative lack of competition as shown by the small numbers. Dairying has customarily been regarded as a high intensity type of farming, but in this investigation it has the low ratio of 2.2 work-days per acre per year, as compared with 90 for

the highest intensity type, market gardening. Cattle and grain farms are usually regarded as extensive types of farming,⁹ which also is verified in this study. The grain farms in the rural-urban fringe zone occupy few people in comparison to their acreage, and the farming intensity is consequently very low, 0.9 work-days per acre annually. Since grain farming is merely a seasonal type of farming, it can be assumed that many operators have part-time occupations outside the farming business.

As pointed out earlier, only 66 out of 105 farm operators delivered complete answers, on which it was possible to base the investigation regarding farming intensity. However, type, location, and in most cases size of farm are known for a considerably higher number of farms, and on the basis of the answers received from the first 66 farmers it may be generalised that all rural-urban fringe zone farms of corresponding types have about the same farming intensity as those from which detailed answers were received.

Table XXIV is based on 117 interviews, and considered to be more representative for the total number of farm operations in the fringe zone. The types of farms are grouped according to farming intensity. Number and per cent of farms in respective groups have been compared with per cent of farms in corresponding groups in the total area

⁹ "Extensive" farming represents the opposite to "intensive"; low input of labor and/or machinery and/or fertilizers.

included in C.D. No. 11.¹⁰ The result is as follows:

TABLE XXIV - NUMBER AND PER CENT OF FARMS IN RURAL-URBAN FRINGE ZONE, ACCORDING TO FARMING INTENSITY, COMPARED WITH PER CENT OF COMMERCIAL FARMS IN CENSUS DIVISION NO. 11

Type of Farming		No. Farms in Rural-Urban Fringe Zone	Per cent/Farm Type, R-U Zone	Per cent/Farm Type, C.D. 11
Very Intensive	Market Gardening	13	12	1
	Fur	2	2	—*
	Hog	4	3	—**
	Poultry	6	5	2
Intensive	Stable	18	15	—**
	Sod	1	1	—*
	Dairy	10	8	17
	Mixed	27	23	10
Ext've	Cattle	12	11	49**
	Grain	24	20	19
Total		117	100	98*

* Fur, sod included in Miscellaneous Specialties in the Census statistics, which make up together 2 per cent of total number of farms.

** "Hog" and "stables" are treated together with "cattle" in the Census statistics.

Source: 1966 Census of Canada, Agriculture, Alberta

¹⁰ Unfortunately the Agricultural Census Statistics provide figures according to production only for commercial farms in the various Census Divisions. Their classification is based upon value of agricultural products sold during the year, in this case 1966, and their dividing line between the two groups, Commercial and Small Scale Farms, is \$2,500 income from agricultural products sold. About 65 per cent of all farms in Census Division No. 11 are commercial farms. Therefore the figures for commercial farms and fringe zone farms are of course not directly comparable, but the commercial farming in the area can still be used as an indicator.

As shown in the table, the agricultural land-use pattern in the fringe zone is very different from that of the entire Census Division. Of the total number of farms in the rural-urban fringe zone, 12 per cent are market gardens, whereas only 1 per cent of that type of agricultural enterprise is found in the larger area. For almost one fourth of the farm operations in the fringe zone, farming is carried out very intensively, and Appendix IV shows that these high intensity farms are confined to an area in proximity to the inner fringe zone boundary. High intensity can therefore be said to be associated with short distances to the urban center. The Census Statistics do not differ among various types of livestock, thus it is impossible to tell how many per cent of the farms in the Census Division belong to the highest intensity group, since no figures are provided separately for hog and fur farms. Still it can be assumed that the proportions between hog and cattle farms and also stables are not the same in the whole Census Division as they are in the rural-urban fringe zone, since farm types which require high input of labor are not found to any great extent far away from urban areas. However, 25 per cent of the farms in the fringe zone are very intensively farmed, and it can be assumed, even in the absence of exact figures, that the corresponding figure for the entire Census Division is considerably lower.

The category "Intensive Farming" includes stables, sod, dairy, and mixed farms, and more than half the number of

farms in the fringe zone belongs to that group, as compared with only 27 per cent in the larger area which constitutes the Census Division. This group should have been comparatively greater if the Census Statistics had included also small scale farms. Many mixed farms, according to the results from the investigation in the fringe zone, were operated on a small scale or part-time basis.¹¹

Most remarkable in this whole table is perhaps the high number of stables in the fringe zone; no fewer than 15 per cent of the total number of farms are stables. It can again be assumed that a very high percentage of the stables are located in densely populated areas, since most of them provide riding lessons and board horses for city people. For the few stables from which owners obtain their income by raising thoroughbred horses for sale, the location factor with respect to the urban center is a matter of less concern. The percentage of mixed farms in the fringe zone is surprisingly high, 23 per cent, especially since so many farmers themselves stress the necessity of specialization in farming in the fringe zone, on account of high land values and general urban pressure. The high figure for mixed farms in the fringe zone depends partly upon the fact that many of the mixed farms are farmed on a part-time basis, and can as such still be considered typical of farming in an area which is undergoing transition from rural to urban land uses.

According to von Thünen's scheme, dairy farms for milk

¹¹ Figures are available here only for part-time operated

were located close to the market, since most dairy products are highly perishable. Modern means of transportation and refrigeration techniques have changed the production conditions for dairy products, and consequently market confinement as to location is no longer of prime importance. In the fringe zone study, only 8 per cent of the farms were dairy farms, compared with 17 per cent in the whole Census Division. Many dairy farmers in the fringe zone agreed that the trend in dairy farming in the Edmonton area is towards larger units with more mechanization and a well developed system of transportation of the products. The need for larger land areas often forces the farmers to move out from the urbanized areas and settle in the truly rural area, a change which in the long run was considered to have economic advantages due to lower land prices, in spite of higher transportation costs.

Cattle and grain farms constitute the last group, which here has been designated "extensive farming". The figures given for the total Census Division show the number of livestock, including hog farms, which in the fringe area have been considered as a very intensive type of farming, and stables, which are regarded in this study to be more labor demanding than usual types of cattle farms. Thus the figures are also not entirely comparable here, but if all three types

¹¹(continued) farms. Of these, which together constitute 40 per cent of the total number of farm holdings in the fringe zone, almost half the number are classified as mixed farms. (See Table XXI)

- hog farms, cattle farms, and stables - are counted together, a percentage of 29 is found for the fringe zone area, as compared with 49 per cent for livestock operations in the entire Census Division. The grain farms in the rural-urban fringe zone are generally the largest and least-intensively farmed agricultural holdings. This is shown in Table XXIII. Figures for the various types of individual farms can be studied in Appendix IV. Several of the grain farms occupy more than 1,000 acres of land. Counted as a percentage, there is almost the same proportion of grain farms in the fringe zone as in the area included in Census Division No. 11; 20 per cent in the fringe zone and 19 per cent of the total number of farms in the entire Census Division represented in the table are grain farms.

In summary, the two assumptions from page 131 concerning eventual conformity between von Thünen's land utilization model and the agricultural land-use pattern in the rural-urban fringe zone of Edmonton can be considered to be satisfied with regard to farm size and farming intensity since 1) an average fringe zone farm is almost invariably smaller than an average farm in the area included in Census Division No. 11. (page 132). 2) With regard to the definition used for the purpose of this study, the average farming intensity in the fringe zone is higher than that of the total Census Division area. Lack of directly comparable figures makes it hard to state the actual degrees of intensity, but always the various types of "very intensive" operations are

vastly more frequent inside the fringe zone than outside it.

According to the figures in Table XXIII and Appendix IV there is a relationship between farming intensity and size of farm holding in the rural-urban fringe zone. In order to establish how close the relationship is, the individual values for farming intensity and size of farm were plotted on double logarithmic paper. Figure 29 shows that there is a very high relationship between the two factors. A correlation analysis¹² based upon the logarithmic transformed values of farm size and farming intensity gave a correlation coefficient of -0.85, tested and found significant at the 1 per cent level. This points out that there is a high inverse logarithmic relationship between farm size and farming intensity, i.e. the farms become smaller as the need for and the tendency towards intensity become greater.

¹² The following formula was used for the correlation:

$$r = \frac{\sum_{i=1}^n x_i y_i - n \bar{x} \bar{y}}{\sqrt{\left[\sum_{i=1}^n x_i^2 - n \bar{x}^2 \right] \left[\sum_{i=1}^n y_i^2 - n \bar{y}^2 \right]}}$$

x_i and y_i are variables ($i = 1, 2, 3, 4, \dots, n$)

r = correlation coeff. \bar{x} = arithmetic mean of x_i

n = number of observ'ns \bar{y} = arithmetic mean of y_i

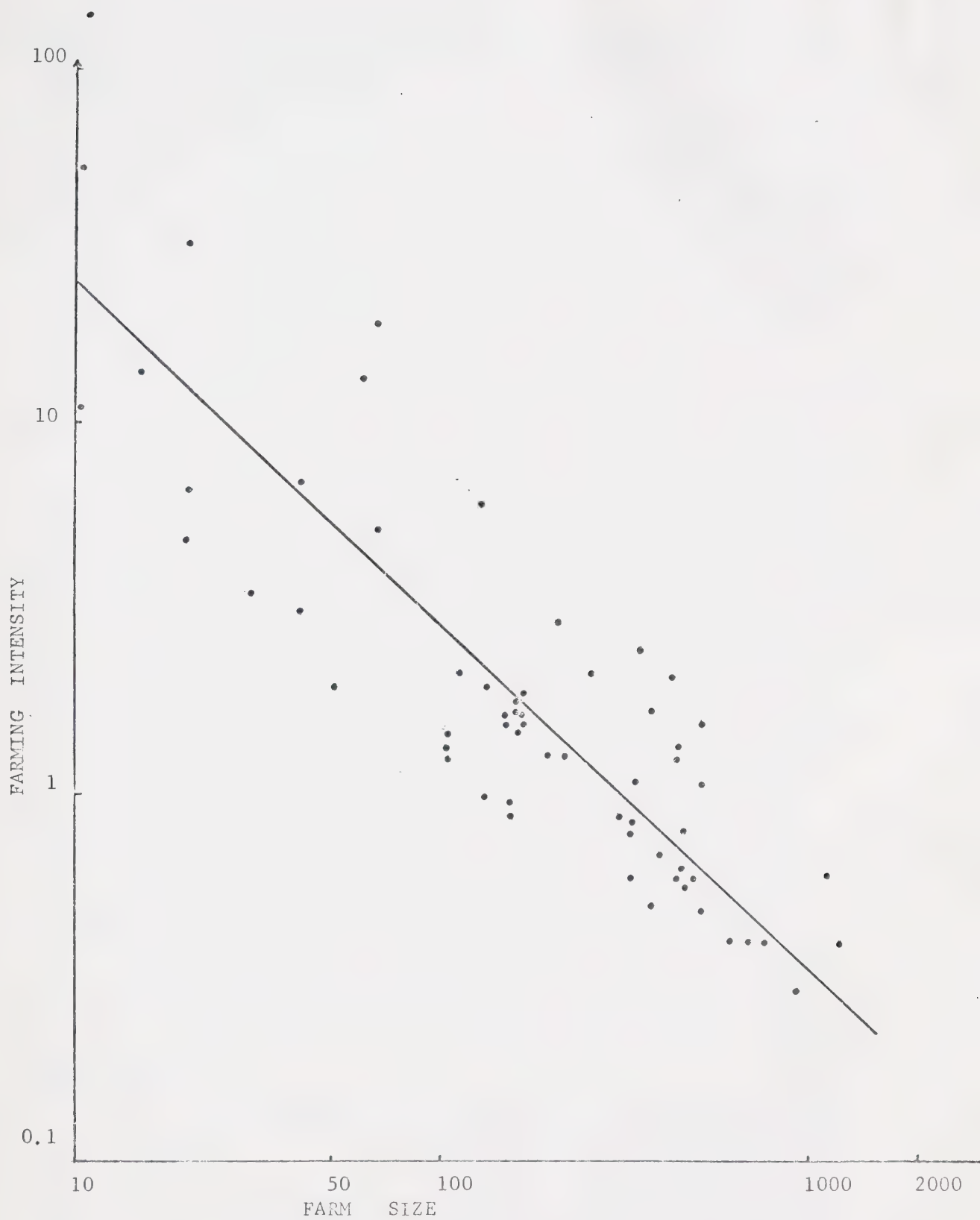


Fig. 29 RELATIONSHIP BETWEEN FARMING INTENSITY AND FARM SIZE
IN THE RURAL - URBAN FRINGE ZONE OF EDMONTON

Sequences of Agricultural Land Uses in the Rural-Urban
Fringe Zone of Edmonton

One last question is whether it is possible to distinguish a sequence of different categories of agricultural land uses in the rural-urban fringe zone of Edmonton, similar to that of von Thünen's model. In the model it is established that the farming intensity decreases proportionately with distance from the market.¹³ Consequently, the next factor to be taken into consideration is distance. Again, the above described procedure was followed; first, the individual values of intensity and distance between the farm holding and the inner fringe zone boundary (see Appendix IV) were plotted on double logarithmic paper, and the pattern which resulted was later compared with the result of a correlation analysis. Neither diagram nor correlation analysis did show any particular relationship between the two factors. The correlation gave a coefficient of -0.3, which merely indicates that the relationship here is also inverse, i.e. more distant farms are generally farmed with less intensity than farms located close to the inner fringe zone boundary.

In further analysis of the data, attention was paid exclusively to number and location of farm operations in each of the ten intensity categories used in Tables XXIII

¹³ In the fringe zone study the term "inner fringe zone boundary" is used instead of "market".

and XXIV rather than to farming intensity per individual farm. Farm category and location with respect to the inner fringe zone boundary was known for a total of 117 farms in the fringe zone. The distance between fringe zone farms and the inner fringe zone boundary could be divided into three zones, all distances counted outwards from the inner fringe zone boundary:

Zone 1 - less than 1.5 miles,

Zone 2 - from 1.5 to 2.5 miles, and

Zone 3 - more than 2.5 miles but less than 4 miles.

These zones were set up with respect to distribution of different farm categories (see Table XXV). According to this investigation, there is a high relationship between the type of farming and distance. Thus the four most intensively farmed categories, Market Gardening, Fur, Hog, and Poultry, have all their highest concentration of individual farm units within the first zone: fur, 100 per cent (only two farms); Poultry, 83 per cent; hog, 75 per cent; and market gardening, 70 per cent. The rest of the farms included in these four categories are without exception located in Zone 2.

The four farming categories - Stable, Sod, Dairy, and Mixed - have the highest concentration of farm holdings in Zone 2, though the distribution of farms in this group is more dispersed. The mixed farms, for instance, have 52 per cent of their category located in the second zone, whereas 41 per cent are found in the first zone and 7 per cent in the third zone. Almost the same percentage variations occur

TABLE XXV - LOCATION OF FARMS WITH RESPECT TO THE INNER FRINGE ZONE BOUNDARY IN
NUMBER AND PER CENT PER ZONE (TOTAL NUMBER OF FARMS - 117)

Distance from Inner Fringe Boundary to Farm	M. Gardening		Fur		Hog		Poultry		Stable	
	No.	%	No.	%	No.	%	No.	%	No.	%
<u>ZONE 1</u>										
Less than 0.5 miles	4		1		0		3		2	
0.5 but less than 1.0 mile	2	70	0	100	0	75	0	83	5	39
1.0 but less than 1.5 miles	3		1		3		2		0	
<u>ZONE 2</u>										
1.5 but less than 2.0 miles	2	30	0	0	0	25	1	17	7	50
2.0 but less than 2.5 miles	2		0		1		0		2	
<u>ZONE 3</u>										
2.5 but less than 3.0 miles	0	0	0	0	0	0	0	0	2	11
3.0 miles and over	0		0		0		0		0	
Total fringe zone	13	100	2	100	4	100	6	100	18	100

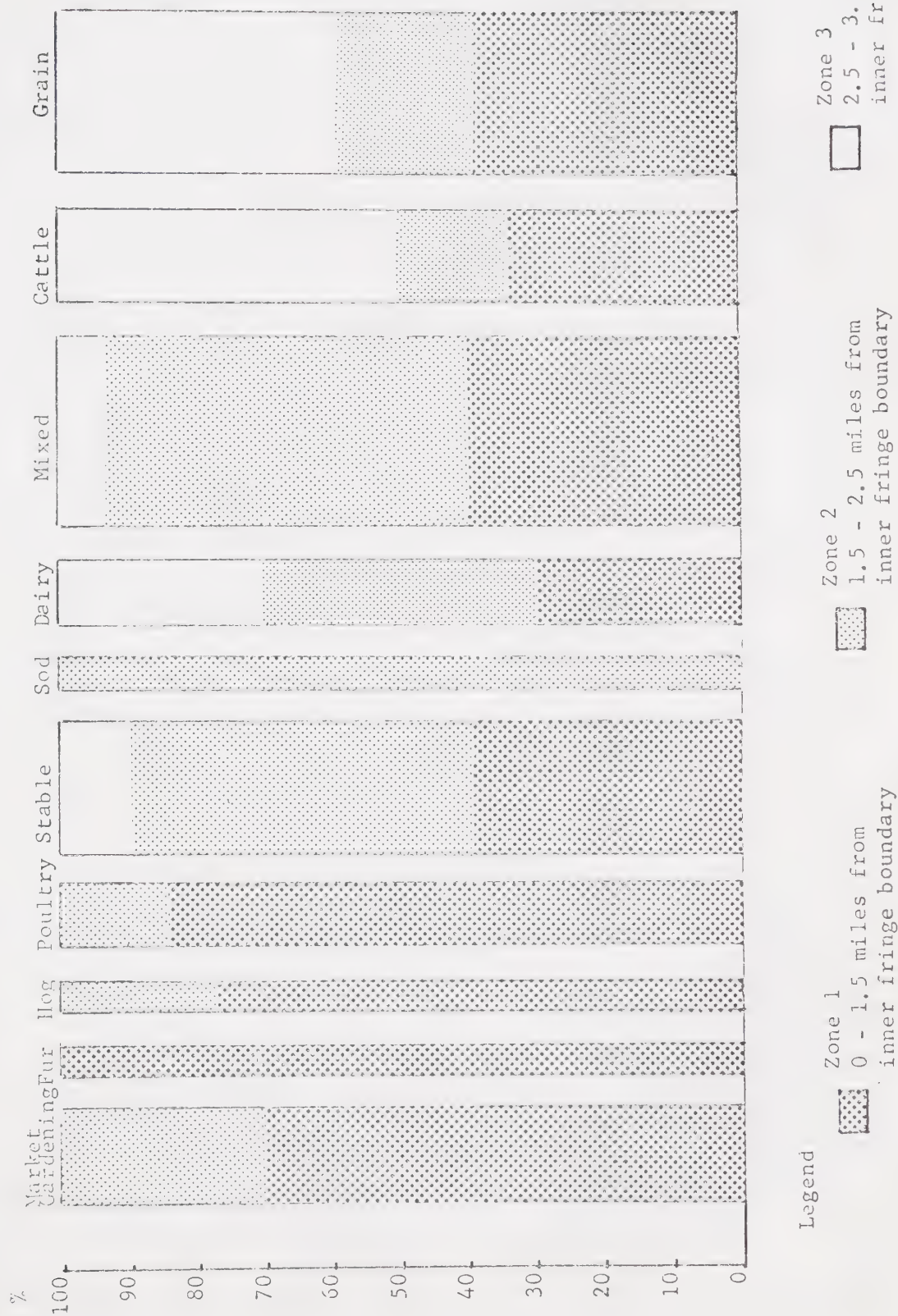
TABLE XXV - (Continued)

Distance from Inner Fringe Boundary to Farm	Sod No.	%	Dairy No.	%	Mixed No.	%	Cattle No.	%	Grain No.	%
<u>ZONE 1</u>										
Less than 0.5 miles	0		1		2		1		0	
0.5 but less than 1.0 mile	0	0	1	30	5	41	1	33	4	38
1.0 but less than 1.5 miles	0		1		4		2		5	
<u>ZONE 2</u>										
1.5 but less than 2.0 miles	1	100	2	40	7	52	2	17	3	20
2.0 but less than 2.5 miles	0		2		7		0		2	
<u>ZONE 3</u>										
2.5 but less than 3.0 miles	0	0	2	30	1	7	3	50	2	42
3.0 miles and over	0		1		1		3		8	
Total fringe zone	1	100	10	100	27	100	12	100	24	100

for stables in the fringe zone. The ten dairy farms distribute themselves almost equally over the whole study area; 40 per cent in Zone 2 and 30 per cent in each of the other two zones. The two types of farms which, in Table XXIV, have been called "extensive types of farming" - Cattle and Grain - are concentrated mainly in the third zone, located farthest away from the inner fringe boundary. Fifty per cent of the cattle farms and 42 per cent of the grain farms are found in the third zone, but high concentrations also occur in Zone 1 - 33 per cent and 38 per cent respectively. The cattle farms located close to the city are more intensively farmed than the rest, as shown in Appendix IV. Some of the cattle and grain farms are operated on a part-time basis. The distribution of the different categories of farms with respect to distance to the inner fringe zone has been graphically illustrated in Figure 30. The width of each column is proportional to the number of farms per category.

Figure 30 can also be drawn as a circle diagram, in which the Legal City boundary is converted to a central point around which the circles are constructed, the radius of which coincides with the three distances in Figure 30 ($r_1 = 1.5$; $r_2 = 2.5$; and $r_3 = 3.5$). (See Figure 31). Zone 1 in this diagram includes the highest concentrations of Market Gardening, Fur, Hog, and Poultry farms, the four agricultural land uses in the fringe zone which have been shown to have the highest farming intensities. The next zone embraces farm types of the second highest intensities, Stables, Sod, Dairy, and Mixed

Fig. 30 Percent number of farms / zone and type in the Rural-Urban Zone of Edmonton. (Width of column proportional to number of farms / category).



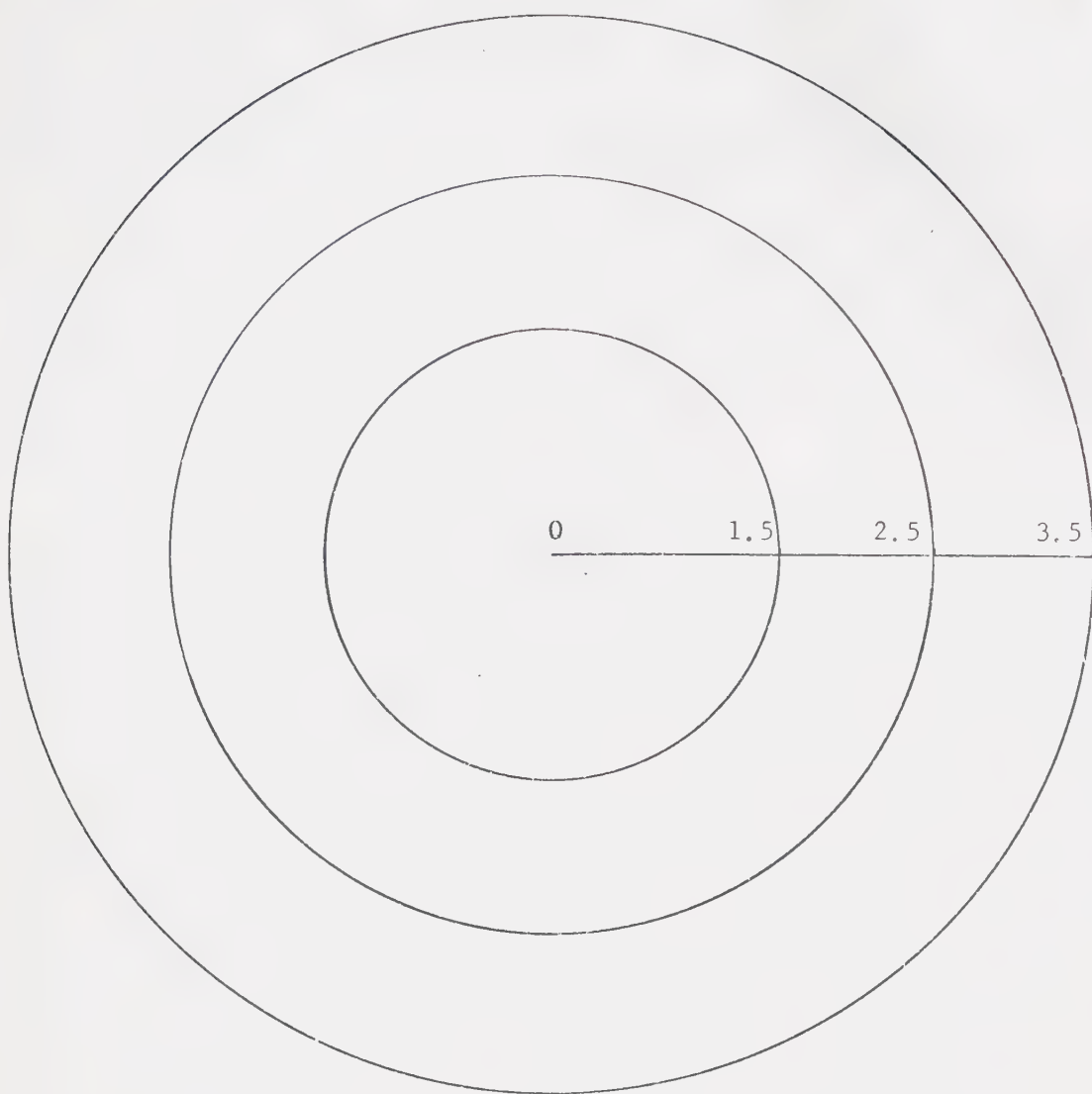


Fig. 31 Sequence of agricultural land uses in the rural - urban fringe zone of Edmonton

- Zone 1 (0 - 1.5 miles from Inner Fringe Boundary)
Highest concentration of Market Gardening, Fur, Hog, Poultry
- Zone 2 (1.5 - 2.5 miles from Inner Fringe Boundary)
Highest concentration of Stables, Sod, Dairy, Mixed
- Zone 3 (2.5 - 3.5 miles from Inner Fringe Boundary)
Highest concentration of Cattle, Grain

farms, and the last zone the highest concentrations of the two farm types of least intensity, Cattle and Grain farms.

Comparative Discussion of von Thünen's Scheme and the Sequence of Agricultural Land Uses around the City of Edmonton

In von Thünen's scheme, six different agricultural land-use zones of decreasing intensity were distinguished, whereas in the Edmonton rural-urban fringe zone only three zones were possible to differentiate.

In spite of the differences with regard to the actual number of zones, there are certain similarities between von Thünen's agricultural land utilization pattern and the developed pattern around the City of Edmonton. The first zone coincides in the two schemes with respect to Market Gardening. In the Edmonton study, the preference of location close to the city border was more frequently explained as a matter of convenience due to the necessity of making several trips per day to the central city than directly as a consequence of lower transportation costs with shorter distance to the market. However, most market garden operators said that they would not produce the same farm products if their farms were located 50 miles further out from the City limits, as transportation costs would be too high. In von Thünen's scheme, the location was exclusively dictated by economic reasons, the Economic Rent for garden products decreased very rapidly with increasing distance from the market because of less efficient transportation facilities.

Zone Number 2 in von Thünen's scheme - the forest area -

does not, of course, play any major role as a supply source for fuel and building materials for today. Actually, much of the energy and fuel sources are, in the case of Edmonton, presently located near the core of the city (for example, the power station and the terminals for oil and gas pipe lines). Still, many modern cities have substantial forest areas located within as well as beyond the corporate limits of the city. These present-day woodlands are to be considered more as a product of urbanization (see the quotation below) and as such, kept as a major resource for urban and recreational purposes. It is not possible to distinguish any regular distribution of these forested areas, and many of them are reduced to small patches only.

Gottman has a thesis about the origin of woodlands which, during recent times, have developed in the urbanized northeastern seaboard of the United States. His theory is probably valid for development around any modern, expanding city.

He states:

These woodlands result from the imbalance between expanding urbanization and shrinking agricultural lands. More formerly tilled farm acreage is being abandoned and is reverting to wooded growth than is being consumed by urban and related special uses, and this has been true for some time. 14

Several of the scattered patches of forest and brush land in the rural-urban fringe zone of Edmonton (See Figures

14 Jean Gottman, Megalopolis: The Urbanized Northeastern Seaboard of the United States. The Massachusetts Institute of Technology Press, Cambridge, Massachusetts, 1964, p. 342.

22a-d) have developed on idle agricultural land during recent years. Stables are often found in connection with these woodlands. These give the latter a value as recreational areas. Thus, indirectly, zone number 2 in von Thünen's model as well as in the Edmonton study can be considered to be related, since stables have their highest concentration in that zone in the rural-urban fringe zone of Edmonton. However, the economic importance of the forested area has changed since von Thünen's time; today it is mainly used for spare-time, recreational purposes. Stables which provide riding lessons depend upon close proximity to the market, that part of the city population which is interested in riding horseback. A location outside the fringe zone would reduce their business possibilities considerably.

In the study of agricultural land uses in the Edmonton fringe zone, it was established that dairy farms have their highest concentration in the second zone. According to von Thünen's scheme perishable products like milk had to be produced in close proximity to the market, and the differences here between the two schemes point out the great changes which have occurred within transportation and refrigeration technology. Actually, the concentration within the second zone of the Edmonton study must be considered to be more by chance, since by percentage a much higher amount of dairy farms is found in the total area included in Census Division 11 than in the rural-urban fringe zone. See Table XXIV. Most of the farmers

interviewed were of the opinion that transportation costs would not be any major hindrance to dairy farming considerably further out from the central city market.

In von Thünen's model, zones 3,4 and 5 are devoted to crop-farming of various intensities, Zone 3 to Intensive Crop-farming (mainly root crops), Zone 4 Crop-farming with Fallow and Pasture, and Zone 5 Three-Field Rotation. In the Edmonton study, intensive crop-farming and crop-farming with pasture and fallow have both been included in Zone 2, together with stables and dairy farming. Grain farms usually practise a three-field rotation and have therefore here been classified as extensive farming, forming a separate group (Zone 3) together with cattle farms, since both of them have their highest concentration of individual farms in an area located more than 2.5 miles outside the inner fringe zone boundary.

With regard to number of farms per category, mixed farming dominates in Zone 2. The mixed farms specializing in root crops are generally located closer to the inner fringe zone boundary than those growing mainly grains. On an average, 10 per cent of the total acreage occupied by mixed farms was in fallow or pasture in summer 1968. With respect to economic returns from farming, the great majority of farm operators considered specialization in grain or cattle to be more profitable than mixed farming at a distance of 50 miles or more from the inner fringe zone boundary.

The third zone, finally, in the Edmonton study can be

compared with Zones 5 and 6 in von Thünen's scheme. The farming here is generally extensive; large areas are used only for grazing and the grain farms have much of their land in fallow or pasture, more precisely about 25 per cent of total farming area. With regard to Table XXIV, this cattle and grain farming zone continues beyond the outer fringe zone boundary, since almost 70 per cent of all commercial farms in Census Division 11 are concentrated in these two categories of farming activities.

CONCLUSION

Von Thünen based his agricultural land use model primarily upon transportation costs which also included time, effort and inconvenience associated with moving labor, and supplies to and from the different production sites. The agricultural pattern of the model changed as a navigable stream flowing through the center of the city was added, since transportation by boat is less expensive than transportation by wagon. Products which earlier could be grown only in close proximity to the market could now be produced considerably further away from it, providing the individual sites were located along the stream. These modifications yield the same Economic Rent.

Apart from von Thünen's model, the development of railroads and modern highways, allowing products to be transported over long distances, has had a similar effect upon the agricultural land use pattern. Refrigeration technology has made it possible to produce all kinds of perishable items far away from the actual city market. Furthermore, even if refrigeration must be employed, transportation costs have declined in relation to other agricultural production costs and are no longer directly

proportional to the distance and bulk. Regional specialization in certain products, often in connection with large-scale production, and generally larger markets for farm products have also aided in altering the criteria for a regular agricultural land-use pattern to develop. For farming areas located close to an urban center, there is another important factor which should be considered, namely the competition for land from non-agricultural uses.

There are many factors which indicate that von Thünen's ideas would have to be reinterpreted in order to have much apparent application to modern situations. Still, the case-study of the agricultural land-use situation in the rural-urban fringe zone of Edmonton shows that it is possible to distinguish an agricultural land-use pattern, similar to that hypothesised by von Thünen for a nineteenth century city.

In the Edmonton study, it has been established that the farm holdings in the inner fringe zone (Zone 1 in Figure 31) generally are specialized, very intensively farmed, and relatively small. These specialized farms are, almost without exception, operated on a full-time basis, in which respect they differ from the mixed farms in the same zone, on which farming often is carried out on a part-time basis. It has likewise been stated that the proportion of abandoned farms in the inner fringe zone is comparatively high, and that various forms of urban land uses have taken place or are in the process of taking place on former agricultural land, even though a considerable number of acres are left completely

idle and in the hands of land speculators. These, we have seen, may become forest patches.

Those farmers who for various reasons prefer to remain on their holdings have usually made a compromise; they have sold a part of their farm land and specialized in a type of farming which gives high economic return in relation to the actual size of the farm, or they have given up full-time farming for other occupations, usually in the city, and carry out the farming more or less as a spare-time hobby. The specialized, intensive types of farming which still are pursued in the inner fringe zone of Edmonton are poultry, hog, and fur raising, and various forms of market gardening, such as green houses, nurseries, and mushroom growing. All these farming categories require high input of labor in order to give good Economic Rent, and can be carried out within extremely limited areas. Actually, many of them might rather be categorized as farm factories, and as such are as much examples of urban as rural land uses.

The most important factor for the agricultural land utilization in this zone involves a strong desire on the part of the farmer to remain on the land which might have been owned by the same family for a long time. Adjustment to the new situation is necessary, for instance by giving up full-time farming or by specializing in certain products. Without doubt, the convenience of easy access to a steady market, which implies low transportation costs, plays a role here.

Also, in the second zone, there is much urban influence

upon the land-use situation. Residential subdivisions and other forms of urban development have only taken place in a few cases, for instance in the northeastern corner of the Strathcona East fringe zone area, where industrial development has spread. This is true of the third zone as well. Large tracts of vacant land which have been taken out of agricultural production are more frequently found in the second than in the first zone. This emphasizes the dynamic character of the rural-urban fringe zone; urban development spreads over the innermost part of the zone, and the area of vacant land moves outwards in conformity with the expanding urban encroachment.

Forest and brush are found on parts of the vacant land. This indicates that the land was taken out of agricultural land uses relatively long ago. In the Edmonton area, there is a tendency for stables to locate within these wooded areas, since they offer a pleasant environment in which to practice horseback riding. Stables represent a form of agricultural specialization and on most of these holdings, the types of farming carried out some years ago were much less specialized. Stables are, to a high degree, market oriented operations. Since they require relatively large areas for grazing and preferably a pleasant, rural environment, they are concentrated in the second zone where land is less expensive than in the inner fringe zone, and where vacant, sometimes wooded areas can more likely be found. Many of the dairy and mixed farms in this zone are for sale,

and many are farmed on a part-time basis. The uncertainty as to when the time will come for the most profitable sale tends to make the farming half-hearted, and former goals such as high production per acre or maintenance of the fertility of the land are no longer the most important factors. However, where areas are zoned for future exclusively agricultural uses, these are generally farmed in an intensive way.

The third zone in the Edmonton agricultural land-use study is likely to remain in farming for a considerable number of years. Urban influence is felt progressively less here, which suggests that land can still be bought at relatively low prices. This fact makes it possible to carry out extensive types of farming, such as cattle and grain, intended for and still influenced by the urban market.

In summary, urban land-uses are higher priced than rural, and in the rural-urban fringe zones, where there is a direct competition for land, the urban uses are more likely to take over. Considerably higher prices can be offered for land for urban development than for land planned to remain in even the most intensive types of agriculture. Land prices also rise in areas located a bit further out from the inner fringe zone boundary, providing urban development is expected to take place there within the near future. Such land is usually being held by speculators and completely removed from agriculture or rented on a year-to-year basis to farmers.

Those individual farm operators who see a chance of

making a profit by selling the farm land for urban development seldom see any reason to invest in improvements of the property. The expectations to make a profit in land decreases with increasing distance from the encroaching city. Principally, the distance from the inner fringe zone boundary decides the value of the land and is consequently the most important factor in determining the agricultural land utilization pattern in the rural-urban fringe of Edmonton, whereas in von Thünen's model, distance was meaningful exclusively in terms of transportation costs.

The economic discussion with regard to the agricultural land use pattern in the fringe zone of Edmonton is inevitably simplified. There are many economic factors that influence today's farming business. Among them is the general social-economic sluggishness in the mobility of farmers, creating surplus production of certain goods. This in turn sometimes forces the governments to drastic action which may include economic support in the form of subsidies. Farmers and their organizations are still politically powerful in Canada and governments are sensitive to their demands. This naturally implies that common economic market mechanisms do not work to any great extent in price setting of agricultural products. Market forces can rather be characterized as exogenous, and as such, are always likely to remain with us under our free enterprise economic system.

BIBLIOGRAPHY

- Alberta, Report of the Royal Commission on the Metropolitan Development of Calgary and Edmonton, Chapter 2, Edmonton, 1956, 21 pp.
- Andrews, R.B., "Elements in the Urban Fringe Pattern", Journ. of Land and Public Utility Econ., Vol. XVIII, No. 2, May, 1942, pp. 169-183.
- _____, "Urban Fringe Studies of Two Wisconsin Cities", Journ. of Land and Public Utility Econ., A summary by Victor Bringe, Vol. XXI, November, 1945, pp. 375-382.
- Andrews, W.H., and Eshleman, R.J., "The New Community", Department of Agric. Econ. and Rural Sociology Bull. No. 955, Ohio Agricultural Experiment Station, Wooster, Ohio, November, 1963, pp. 3-38.
- Arpi, Gunnar, "Medelstor Stad - Planering och miljö", Ymer Arsbok 1966, Svenska Sällskapet för Antropologi och Geografi, Generalstabens Litografiska Anstalts Forlag, Stockholm, 1966, pp. 7-37.
- Arpke, Frederick, "Land Use Control in the Urban Fringe of Portland, Oregon", Journ. of Land and Public Utility Econ., Vol. XVIII, No. 4, November, 1942, pp. 468-483.
- Ashby, A.W., "The Effects of Urban Growth on the Countryside", The Sociological Review, Vol. XXXI, No. 4, October, 1939, pp. 345-369.
- Baker, W.B., "The Changing Rural Environment: Implications for Rural Extension Research and Training", Extension Papers, Department of Extension, University of Alberta, Edmonton, 1958, pp. 1-7.
- Balk, Helen H., "Rurbanization of Worcester's Environs". Econ. Geogr., Vol. 21, No. 2, April, 1945, pp. 104-116.
- Barlowe, Raleigh, Land Resource Economics, Chapters 2 and 9, Prentice Hall Inc., Englewood Cliffs, New York, 1958, pp. 17-47, and 242-283.
- Bartholomew, Harland, Land Use in American Cities, Harvard University Press, Cambridge, Mass., 1955, 196 pp.
- Batekelet, C.E., "Cities and Rural Areas Within Cities", Geogr. Review, Vol. XXXI, July, 1941, p. 503.
- Bayrock, L.A. and Hughes, G.M., "Superficial Geology of the Edmonton District, Alberta", Research Council of Alberta Preliminary Report 62-6, Edmonton, 1962, 40 pp.

- Beegle, J. Allan, "Characteristics of Michigan's Fringe Population", Rural Sociology, Vol. XII, September, 1947, pp. 254-263.
- Berkman, H.G., "Decentralization and Blighted Vacant Land", Land Econ., Vol. XXXII, August, 1956, pp. 270 - 280.
- Blizzard, Samuel W., and Anderson, William F., "Problems in Rural-Urban Fringe Research: Conceptualization and Delineation", Progress Report No. 89, Pennsylvania State College Agricultural Experimental Station, 1952, pp. 1-39.
-
- "Research on the Rural-Urban Fringe: A Case Study", Sociology and Social Research, Vol. XXXVIII, 1954, pp. 143-149.
- Blumenfield, Hans, "Residential Densities", Community Planning Review, Vol. VII, No. 2, June, 1957, pp. 82-84.
- Bogue, Donald J., Metropolitan Growth and the Conversion of Land to Non-Agricultural Uses, Published by Schripps Foundation for Research in Population Problems, Miami University, and Population Research and Training Center, University of Chicago, Miami University, Ohio, 1956, pp. 1-33.
- Bollens, John C., and Schmandt, Henry, The Metropolis: Its People, Politics and Economic Life, Harper and Row Publishers, New York, 1965 pp. 643.
- Bonser, H.J., "Part-time Farming in the Knoxville City-Country Fringe", Publication No. 28, South East Land Tenure Committee, The University of Tennessee, Agricultural Experiment Station, September 1957, pp. 1-13.
- Bowser, W.E., Kjearsgaard, A.A., Peters, T.W., and Wells, R.E., Soil Survey of Edmonton Sheet (83-H), Alberta Soil Survey Report No. 21, University of Alberta Bulletin No. SS-4, 1962, pp. 1-66.
- Boyce, Renald R., "The Edge of the Metropolis - the Wave Theory Analog Approach", B.C. Geographical Series, No. 7, Vancouver, 1966, pp. 31-40.
- Bryant, G.W.R., "Land Speculation: Its Effects and Control", Plan, Canada, Vol. V, No. 3, 1965, pp. 109-121.
- Buchmire, George E., and Rogers, Walter B., "Changing Rural Attitudes", Agricultural Economics, Special Report 8, May 1967, University of Alberta, Edmonton, pp. 1-25.

- Burroughs, Roy J., "Should Urban Land be Publicly Owned?", Land Economics, Vol. XXXII, No. 1, 1966, pp. 11-20.
- Canada, Department of Agriculture, and the Alberta Department of Agriculture, Alberta Farm Guide 1967, The University of Alberta, Edmonton, 1967, pp. 1-240.
- Canada, Dominion Bureau of Statistics, Canada Year Book 1968, Population, Ottawa, 1968, pp. 189-226.
- _____. Census of Canada, Agriculture, Population, 1951-1966, Ottawa.
- Chapin, F. Stuart, Urban Land Use Planning, Urbana, University of Illinois Press, 1965, 498 pp.
- Chisholm, Michael, Rural Settlement and Land Use, Hutchinson University Library (ed. W.G. East), London, 1968, 183 pp.
- City of Edmonton, General Plan, Edmonton, Alberta, 1967, 170 pp.
- _____, City Planning Department, Draft General Plan for the City of Edmonton,
 Part 1 - Edmonton: Introductory Statement
 Part 2 - Growth and Economics
 Part 3 - Land Uses
 Edmonton, 1963.
- _____, City Planning Department, Annual Report, 1967.
- _____, City Planning Department, "The Nature and Extent of Feedlot and Piggery Operations in Edmonton", Research Report No. 4, May, 1967, pp. 1-33.
- _____, City Planning Department, "Residential Land Use Staging 1967-1971", Research Report No. 5, June, 1967, pp. 1-35.
- _____, City Planning Department, West Jasper Place: Review Area, Outline Plan, Edmonton, 1967, 77 pp.
- _____, Department of Industrial Development, Industrial Directory 1967, Edmonton, 1967, 30 pp.
- Clawson, Marion, et al., Land for the Future, Published for Resources for the Future by the John Hopkins University Press, Baltimore, 1960, 570 pp.

- Clawson, Marion, "Urban Sprawl and Land Speculation", Land Econ. Vol. XXXVIII, No. 1, February, 1962, pp. 99-111.
- Coleman, Alice, "The Planning Vacuum in the Ottawa Region", Department of Mines and Technical Surveys, Geographical Branch, Ottawa, February, 1966, pp. 1-151.
- Crerar, A.D., "The Loss of Farmland in the Metropolitan Regions of Canada", Regional and Resource Planning in Canada, Krueger, Ralph, et al (eds.), Holt, Rinehart and Winston of Canada Ltd., Toronto, 1967, pp. 106-114.
- _____, "Urban Sprawl - The Causes", Occassional Papers in Geography, No. 1-4, Hardwick, W.G. and J.D. Chapman, (eds.), (1960-1963), Tantalus Research Ltd., Vancouver, 1965, pp. 7-11.
- Crosswhite, W.M. "Part-time Farming - Part-Time Jobs", Year Book of Agriculture, 1963, U.S. Department of Agriculture, Washington D.C., 1963, pp. 146-151.
- Daniels, Per Anders, The Urban Heat Island and Air Pollution with Application to Edmonton, Alberta, Unpublished M.Sc. Thesis, University of Alberta, Edmonton, 1965.
- Davies, P.G., "Are Municipal Boundaries Obsolete", Community Planning Review, Vol. VII, No. 4, December, 1957, pp. 161-162.
- Davies, Ivor, "Urban Farming: A Study of the Agriculture of the City of Birmingham", Geogr., Vol. XXXVIII, No. 4, November, 1953, pp. 296-303.
- Delafons, John, Land Use Controls in the United States, Joint Center for Urban Studies of the Massachusetts Institute of Technology and Harvard University, Cambridge, 1962, pp. 1-100.
- Demsey, Hugh A., Historic Sites of the Province of Alberta, Publicity Bureau, Department of Economic Affairs, Government of the Province of Alberta, Edmonton, 1955.
- Department of Municipal Affairs, Research Division, Population 1-2, Provincial Planning Branch, September and December, 1967, 60. pp.
- _____, Annual Report of the Province of Alberta, 1958, Queen's Printer, Edmonton, 1960.
- _____, Annual Report of the Province of Alberta, 1967, Queen's Printer, Edmonton, 1969.

- Dewey, Richard, "The Peripheral Expansion in Milwaukee County", Amer. Journ. of Sociology, Vol. 54, No. 2, September, 1948, pp. 118-125.
- _____, "The Rural-Urban Continuum: Real but Relatively Unimportant", Amer. Journ. of Sociology, Vol. 66, July, 1960, pp. 60-66.
- Dickinson, Robert E., City Region and Regionalism, A Geographical Contribution to Human Ecology, Oxford University Press, New York, 1947, 327 pp.
- Dobriner, William M., (ed.), The Suburban Community, G.P. Putnam, New York, 1958, 416 pp.
- Duncan, Otis D., and Rews, Albert J. Jr., "Suburb and Urban Fringe", The Suburban Community, Dobriner, W. M. (ed.), G.P. Putnam's Sons, New York, 1958, pp. 45-66.
- Dyos, H.J., Victorial Suburb: A Study of the Growth of Camberwell, University Press, Leicester, 1961, 240 pp.
- Editors of Fortune Magazine, The Exploding Metropolis, Doubleday and Company, Inc., Garden City, New York, 1957, 170 pp.
- Edmonton Weather Office, Annual Meteorological Summary, 1968, Long Term Records, 1881-1968, Edmonton, 1968, 40 pp.
- Ely, Richard T. and Wehrwein, George S., Land Econ., The MacMillan Company, New York, 1940, 481 pp.
- Fellman, J.D., "Urban Intent and Urban Expansion", Land Econ., Vol. XXXI, No. 3, August, 1955, pp. 280-282.
- Firey, Walter, "Ecological Considerations in Planning for Rurban Fringes", Amer. Sociological Review, Vol. XI, No. 4, August, 1946, pp. 411, 423.
- _____, "Social Aspects to Land Use Planning in the Country-City Fringe: The Case of Flint, Michigan", Agricultural Experimental Station Special Bull. 339, Michigan State College, June, 1946, pp. 1-41.
- Forward, Charles N., and Raymond, Charles W., "Small-Scale Mapping and Statistical Data", Econ. Geogr., Vol. XXXV, No. 3, July, 1959, pp. 315-321.
- Fuguitt, G.V., "Urban Influence and the Extent of Part-time Farming", Rural Sociology, Vol. 23, 1958, pp. 393-397.
- Gaffney, M.M., "Urban Expansion - Will it ever Stop?", Yearbook of Agriculture, 1958, U.S. Department of Agriculture, Government Printing Office, Washington D.C., 1958, pp. 503-522.

- Gasson, Ruth, The Influence of Urbanization on Farm ownership and Practice, Department of Agricultural Economics, Wye College, University of London, London, 1966, pp. 1-90.
- Gertler, Leonard, "Why Control the Growth of Cities?", Community Planning Review, Vol. V, No. 4, December, 1955, pp. 151-154.
- Gist, Noel P., "Ecological Decentralization and Rural-Urban Relationships", Rural Sociology, Vol. XVII, 1952, pp. 328-335.
- Golledge, R.G., "Sidney's Metropolitan Fringe: A Study in Urban-Rural Relations", The Australian Geographer, Vol. 1, January, 1960, pp. 243-255.
- Gottmann, Jean, Megalopolis: The Urbanized Northeastern Seaboard of the United States, The Massachusetts Institute of Technology, Cambridge, Massachusetts, 1964, 810 pp.
- Gottmann, Jean, and Harper, Robert A., (eds.) Metropolis on the Move: Geographers Look at Urban Sprawl, John Wiley and Sons, Inc., New York, 1967, 203 pp.
- Gregor, Howard F., "Urban Pressure on California Land", Land Econ., Vol. 33, No. 4, November, 1957, pp. 311-325.
- Griffen, Paul F. and Chatham, Ronald L., "Urban Impact on Agriculture in Santa Clara County, California", A.A.A.G., Vol. 48, September, 1958, pp. 195-208.
- Grotewold, Andreas, "Von Thunen in Retrospect", Econ. Geogr., Vol. 35, July, 1959, pp. 346-355.
- Hanlon, E.E., "Twenty Years of Change in a Proportion of a Rural-Urban Fringe of Syracuse, New York", A.A.A.G., Vol. 46, June, 1956, p. 249.
- Hanson, E.J., The Potential Unification of the Edmonton Metropolitan Area. A Fiscal Study of Annexation and Amalgamation, Edmonton, Alberta, 1968, 227 pp.
- Harris, C.D., "The Pressure of Residential Industrial Land Use", in W.L. Thomas (ed.), Man's Role in Changing the Face of the Earth, University of Chicago Press, Chicago, 1956, pp. 881-895.
- _____, "Suburbs", Amer. Journ. of Sociology, Vol. XLIX, July, 1943, pp. 1-13.
- Harvey, Robert O., "The Nature and Economics of Urban Sprawl", Land Econ., Vol. XXXXI, No. 1, February, 1965, pp. 1-9.

- Higbee, Edward, C., The Squeeze: Cities Without Space, William Morrow and Co., Inc., New York, 1960, 348 pp.
- Hiller, E.T., "Extension of Urban Characteristics into Rural Areas", Rural Sociology, Vol. VI, No. 3, September, 1941, pp. 242-257.
- Hind-Smith, Joan, "The Impact of Urban Growth on Agricultural Land : A Pilot Study", Resources for Tomorrow Supplement, October, 1961, pp. 155-179.
- Hagerstrand, Torsten, "The Propagation of Innovation Waves", Lund Studies in Geography, Ser. B, Human Geography, No. 4, Lund, 1952, pp. 1-21.
- Jaco, E.G., and Belknap, J., "Is a New Family Form Emerging in the Urban Fringe?", Amer. Sociological Review, Vol. 18, No. 5, October, 1953, pp. 551-557.
- Johnson, James, H., Urban Geography - An Introductory Analysis, Pergamon Press, Oxford, 1967, 188 pp.
- Kaldor, Donald, Bauder W., and Trautwein, M., "Impact of New Industry on an Iowa Rural Community", Special Report No. 37, Iowa State University of Science and Technology, Ames, Iowa, April, 1964, pp. 1-32.
- Kane, Paul, "Wanderings of an Artist Among the Indians of North America", Masterworks of Canadian Authors, John W. Garvin, B.A. (ed.), The Radisson Society of Canada Ltd., Toronto, 1925, 329 pp.
- Kendrew, W.G., and Currie, B.W., The Climate of Central Canada, Queen's Printer, Ottawa, 1955, 194 pp.
- Kimball, Solon T., "The New Social Frontier: The Fringe", Agricultural Experimental Station Special Bull. 360, Michigan State University, June, 1949, pp. 1-35.
- Krueger, Ralph et.al., (eds.) Regional and Resource Planning in Canada, Holt, Rinehart, and Winston of Canada, Ltd., Toronto, 1963, 218 pp.
- _____, "The Disappearing Niagara Fruit Belt", Regional and Resource Planning in Canada, Krueger, Ralph, et al., (eds.), Holt, Rinehart and Winston of Canada, Ltd., Toronto, 1963, pp. 115-129.
- _____, "The Rural-Urban Fringe Taxation Problem", Land Econ., Vol. 33, No. 3, August, 1957, pp. 264-269.

- Kurtz, Richard A. and Eicher, Joanne B., "Fringe and Suburb: A Confusion of Concepts", Social Forces, Vol. 37, October, 1958, pp. 32-37.
- Kurtz, Richard A. and Smith, Joel, "Social Life in the Rural Urban Fringe", Rural Sociology, Vol. 26, 1961, pp. 24-38.
- Langton, George, "Delimiting the Main Line District of Philadelphia", Econ. Geogr., Vol. 28, No. 1, January, 1952, pp. 57-65.
- Linge, G.J.R., The Delineation of Urban Boundaries for Statistical Purposes, with Special References to Australia, A Report to the Commonwealth Statistics, Canberra, Australia, Research School of Pacific Studies, Department of Geography, 147 pp.
- Lithwick, N.H., and Paquet, G., (eds.), Urban Studies: A Canadian Perspective, Methuen, Toronto, 1968, 290 pp.
- Lively, Charles E. "Introduction to "The Sociological Significance of the Rural-Urban Fringe", Rural Sociology, No. 18, 1953, p. 101.
- Longley, R.W., "Climate and Weather Patterns", Alberta - A Natural History, W.G. Hardy (ed. in Chief), M.G. Hurtig Publishers, Edmonton, 1967, pp. 53-67.
- Lower Mainland Regional Planning Board of British Columbia, "Countryside to Suburb", Supp. Study to Land for Living, No. 3, 1963, 43 pp.
-
- Economic Aspects of Urban Sprawl, A Technical Report, May, 1956, 45 pp.
-
- Industrial Land Prospects in the Lower Mainland Region, 1961, pp. 1-40.
-
- "The Urban Frontier", Supp. Study to Land for Living, No. 3, 1963, 20 pp.
-
- Urban Sprawl, April, 1956, pp. 1-44.
-
- MacGregor, J.G., Edmonton - A History, M.G. Hurtig Publishers, Commercial Printers Ltd., Edmonton, 1967, 328 pp.
- MacKay, Angus N., "Land Speculation - A Comment", Plan, Vol. 6, No. 2, University of Toronto Press, 1965, pp. 82-91.

- Maltey, I.M., "Veldhoven: The Rural-Urban Fringe in the Netherlands", abstract in A.A.A.G., December, 1965, p. 631.
- Manning, Travis W., "Performance of the Hog Marketing System in Alberta", Agricultural Economics Research Bull. 4, July, 1967, 25 pp.
- _____, and Buckmire, George, "Economic Growth in Agriculture: A Comparative Analysis of Two Agricultural Areas in Alberta", Agricultural Economics Research Council of Canada, Edmonton, 1967, pp. 1-40.
- Marshall, Douglas G., The Story of Kenosha County, Wisconsin, Population Change in an Urbanized Area, Univeristy of Wisconsin, Madison, July, 1964, pp. 1-56.
- Martin, Walter T., "Ecological Change in Satellite Rural Areas", Amer., Sociological Review, Vol. XXII, No. 2, April, 1957, pp. 173-183.
- _____, "The Rural-Urban Fringe: A Study of Adjustment to Residence Location", Studies in Sociology No. 1, Eugene, Oregon, University of Oregon Press, 1953, pp. 1-109.
- McKain, Walter C., and Burnright, Robert G., "The Sociological Significance of the Rural-Urban Fringe from the Rural Point of View", Rural Sociology, Vol. 18, 1953, pp. 108-114.
- Melvin, Bruce L., "The Place of the Part-Time Farmer", Rural Sociology, Vol. 19, 1954, pp. 281-286.
- Morril, Richard L., "Expansion in the Urban Fringe, A Simulative Experiment", Regional Science Association Papers, Vol. 15, pp. 185-199.
- Murphy, Raymond E., The American City An Urban Geography, McGraw-Hill Book Company, New York, 1966, 443 pp.
- _____, "Town Structure and Urban Concepts in New England", The Professional Geogr., Vol. 16, No. 2, March, 1964, pp. 1-6.
- Myers, Richard R., and Beegle, Allan J., "Delineation and Analysis of the Rural-Urban Fringe", Applied Anthropology, Vol. VI, Spring, 1947, pp. 14-22.
- Nesius, Ernest, J., "The Rural Society in Transition", Public Affairs Series, No. 3, West Virginia University, Norgantown, West Virginia, April, 1966, pp. 1-65.

- Noble, Henry F., "Trends in Farm Abandonment", Cdn. Journ. of Agricultural Economics, Vol. X, No. 1, 1956, pp. 69-77.
- Pahl, R.E., Urbs in Rure: The Metropolitan Fringe in Hertfordshire, London School of Economics and Political Science, Geography Papers No. 2, London, 1964, 83 pp.
- Pearson, N., "Hell is a Suburb", Community Planning Review, Vol. VII, No. 3, September, 1957, pp. 124-128.
- Pryor, R.J., "A Sampling Frame for the Rural-Urban Fringe", Professional Geographer, Vol. XX, No. 4, July, 1968, pp. 257-261.
- Queen, A. Stuart, and Carpenter, D., "The Sociological Significance of the Rural-Urban Fringe from the Urban Point of View", Rural Sociology, Vol. 18, 1953, pp. 102-108.
- Reeder, Leo G., "Industrial Deconcentration as a Factor in Rural-Urban Fringe Development", Land Econ., Vol. 31, August, 1955, pp. 275-280.
- Rodehaver, Myles, W., "Fringe Settlement as a Two Directional Movement", Rural Sociology, Vol. XII, March, 1947, pp. 49-51.
- Rogers, Walter B., and Buckmire, George E., "Effects of Farm Technology and Consequent Problems of Adjustment Effects of Industrialization on Agricultural Production", Agricultural Economics, Special Report 6, March, 1967, University of Alberta, pp. 1-30.
-
- _____, "The Rural Church, the Farm Family", Agricultural Economics Special Report 7, May, 1967, University of Alberta, pp. 1-27.
- Rohrer, W., and Hirzel, R., "A Methodological Note on Demographic Analyses of the Rural-Urban Fringe", Rural Sociology, Vol. 22, pp. 71-73.
- Ross, Alexander, The Furhunters of the Far West: A Narrative of Adventures of the Oregon and Rocky Mountains, Smith, Elder, and Co., London, 1855, 320 pp.
- Roterus, Victor, and Hughes, I. Harding, "Governmental Problems of Fringe Areas", Public Management, Vol. 30, 1948, pp. 94-97.
- Russwurm, L.H., The Rural-Urban Fringe with Comparative References to London, Kitchener-Waterloo and Sarnia, Unpublished M.A. Thesis, The University of Western Ontario, 1961, 194 pp.

- Saunders, D.A., "Race for the Suburbs", Fortune, 1951 (11), pp. 99-102.
- Saunders, Fred B., "Economic Analysis of Part-time Farming in Georgia", Georgia Agricultural Experiment Stations, Bulletin N.S. 65, December 1959, pp. 16-31.
- Schaffer, A., "A Rural Community at the Urban Fringe", Rural Sociology, Vol. 23, 1958, pp. 277-285.
- Schmid, A.A., Converting Land From Rural to Urban Uses, Resources for the Future, Inc., The John Hopkins Press, Baltimore, Maryland, 1968, pp. 1-103.
- Schnore, Leo, F., "The Growth of Metropolitan Suburbs", Amer. Sociological Review, Vol. 22, No. 2, April 1957, pp. 165-173.
- _____. "Metropolitan Growth and Decentralization", Amer. Journ. Sociology, Vol. LXIII, September 1957, pp. 171-182.
- _____. The Urban Scene, Human Ecology and Demography, The Free Press, Collier-Macmillan Ltd., N.Y., 1965, 364 pp.
- Sermenti, Enrico, "Agriculture in Areas of Urban Expansion - an Italian Study", Journ. Town Planning Institute, Vol. 54, no. 1, January 1968, pp. 15-17.
- Sinclair, Robert, "Von Thünen and Urban Sprawl", A.A.A.G., Vol. 57, No. 1, March, 1967, pp. 72-87.
- Smith, Derek L., "Market Gardening at Adelaide's Urban Fringe", Econ. Geogr., Vol. 42, No. 1, February 1966, pp. 19-36.
- Smith, Helen, "White Bluff: A Community For Commuters", Econ. Geogr., Vol. 19, April 1943, pp. 143-148.
- Smith, P.J., "Rural Interests in the Physical Expansion of Edinburgh", Occasional Papers in Geography, No. 7, W.G. Hardwick and J.D. Chapman (eds.), Vancouver, Tantalus Research Ltd., 1966, pp. 55-67.
- Smith, S.C., "The Rural-Urban Fringe Problem", 1-2 California Agriculture, 13(2):2 February -March, 1959, p. 2.
- Stewart, C.T., "The Urban-Rural Dichotomy, Concepts and Uses", Amer. Journ. Sociology, Vol. 64, No. 2, September 1958, pp. 152-158.
- Stoeckel, John E., and Beegle, Allan J., "The Relationship Between the Rural-Urban Age Structure and Distance from a Metropolitan Area", Rural Sociology, Vol. 31, 1966, pp. 346-354.

- Strathers, J.K., "The Effect of Urban Sprawl", Occasional Papers in Geography, Nos. 1-4, W.G. Hardwick and J.D. Chapman (eds.), 1960-1963, Vancouver, Tantalus Research Ltd., pp. 11-14.
- Suski, Julian G., Edmonton, City of Edmonton, 1965, 58 pp.
- Thompson, Wilbur R., A Preface to Urban Economics, Pub. for Resources for the Future Inc. by the Johns Hopkins Press, Baltimore, 1965, 410 pp.
- United Nations, Data on Urban and Rural Population in Recent Censuses, New York, July 1950.
- United States of America, Bureau of the Census, Statistical Abstracts of the United States, Washington, D.C., 1950-1968.
- Waldo, D., "Farming on the Urban Fringe", Yearbook of Agriculture, 1963, United States Department of Agriculture, Washington D.C., pp. 139-145.
- Walrath, Arthur J., "Equalization of Property Taxes in an Urban-Rural Area", Land Econ., Vol. 33, No. 1, February, 1957, pp. 47-54.
- Watt, A.B., "Edmonton", Cdn. Geogr. Journ., Vol. 33, 1946, pp. 242-251.
- Wehrwein, George, S., "The Rural-Urban Fringe", Econ. Geogr., Vol. 18, July; 1942, pp. 217-228.
- Whitney, V.H., "Rural-Urban People", Amer. Journ. of Sociology, Vol. 54, July, 1948, pp. 48-54.
- Wibberley, G.P., "Agriculture and Land Use Planning", Town Planning Review, Vol. 32, 1961-1962, pp. 77-94.
- Wibberley, G.P., Agriculture and Urban Growth: A Study of the Competition for Rural Land, London, Michael Joseph, 1959, 240 pp.
- Wilt, H.S. "Managing the Small Part-Time Farm", Extension Bull. No. 341., 1965, pp. 4-46.
- Windsor, R.F., The Campus Fringe of the University of Alberta, Unpublished M.A. Thesis, Univeristy of Alberta, Edmonton, 1964, 153 pp.
- Wissink, G.A., American Cities in Perspective, University of Utrecht, Geographical Institute Publications No. A 19, Utrecht, 1962, 320 pp.

Zummer, Basin, and Hawley, A., "Local Governments as Viewed by Fringe Residents", Rural Sociology, Vol. 23, 1958, pp. 363-370.

Wonders, W.C., "Edmonton, Alberta: Some Current Aspects of its Urban Geography", Cdn. Geogr., No. 9, 1957, pp. 7-20.

_____, "River Valley City - Edmonton on the North Saskatchewan", Cdn. Geogr., No. 14, 1959, pp. 8-16.

APPENDIX I

AGRICULTURE QUESTIONNAIRE

Number _____

Name and address of the operator (person in charge of the Holding - owner, tenant, or hired manager).

Name _____

Address _____ Phone _____

1) How long have you lived at this address?

- 1) less than 1 year _____
- 2) 1 but less than 2 years _____
- 3) 2 but less than 5 years _____
- 4) 5 but less than 10 years _____
- 5) 10 years and more _____

2) Age of the operator?

- 1) Under 25 years _____
- 2) 25 - 34 years _____
- 3) 35 - 44 years _____
- 4) 45 - 54 years _____
- 5) 55 - 59 years _____
- 6) 60 years and over _____

3a) Are you renting or buying your home?

- 1) Rented or leased _____
- 2) Buying (own but mortgaged) _____
- 3) Own free and clear _____

3b) Do you operate for others as a hired manager?

Yes _____

No _____

4) How much land do you operate? (Include all land whether owned, rented, or leased from others or managed. Do not include land owned by you but rented to others.)

Owned

- 1) 1 but less than 3 acres _____
- 2) 3 but less than 9 acres _____
- 3) 10 but less than 69 acres _____
- 4) 70 but less than 239 acres _____
- 5) 240 but less than 399 acres _____
- 6) 400 acres and more _____

Rented, leased or managed

- 1) 1 but less than 3 acres _____
- 2) 3 but less than 9 acres _____
- 3) 10 but less than 69 acres _____

Rented, leased or managed (continued)

- 4) 70 but less than 239 acres _____
 5) 240 but less than 399 acres _____
 6) 400 acres and more _____

5) Is your farm for sale?

Yes _____

No _____

6) If not, is part of your farmland for sale?

Yes _____

No _____

7) If yes, approximately how much is for sale?

Area in:
 % Acres

- 1) less than 10% of the total farmland _____
 2) 10% but less than 50 % of the total farmland _____
 3) 50% and more of the total farmland _____
 4) all farmland but not the farmhouse _____

8a) What is the approximate value of your land per acre? _____

b) What was the approximate value 5 years ago? _____

9) What do you consider to be the main cause for the changing land value?

- 1) General inflation _____
 2) Land speculation due to the fast growth of Edmonton _____
 3) Different farm improvements during the last 5 years _____
 4) More developed communication system in the area _____
 5) Other reasons _____

10) Do you like the location of the farm?

Yes _____

No _____

11) If not, what is the most important reason for your dislike?

- 1) Poor soil _____
 2) Too close to the city _____
 3) (For farms within the city limits) Restrictions from building and use regulations _____
 4) Other Reasons _____

- 12) What do you consider as the most important factor for carrying out your type of farming in this area?
- 1) Good soil _____
 - 2) Low transportation costs for farm products due to the proximity to the city _____
 - 3) Other reasons _____
-
- 13) Would you produce the same farm products if your farm was situated 50 miles further out from the city limits?
- Yes _____
- No _____
- 14) If not, briefly tell the reason _____
-
-
- 15) How are your products transported to market for sale?
- 1) By own truck _____
 - 2) By company truck _____
 - 3) By railroad _____
 - 4) By airplane _____
 - 5) By other means of transportation _____
- 16) Use of land in 1968 Acres % of
- | | <u>Total</u> | <u>% of</u> |
|--|--------------|-------------|
| 1) Cropland sown or to be sown for harvest in 1968 (include field crops, vegetables, fruits, nursery and greenhouse products etc.) | _____ | _____ |
| 2) Improved land for pasture or grazing | _____ | _____ |
| 3) Summer fallow | _____ | _____ |
| 4) Improved idle land | _____ | _____ |
| 5) Other land (Include woodland, unimproved hay land, native pasture, barnyards, etc.) | _____ | _____ |
- 17) What per cent of your land is in:
- %
- 1) grain _____
 - 2) hay _____
 - 3) fodder-crops _____
 - 4) root-crops _____
 - 5) orchard _____
 - 6) horticulture _____
 - 7) other _____
-
- 18) How would you classify your farm?
- 1) mixed _____
 - 2) grain _____
 - 3) root-crop _____
 - 4) horticulture _____
 - 5) dairy _____

How would you classify your farm? (continued)

- 6) poultry _____
 - 7) cattle _____
 - 8) stable _____
 - 9) fur-farming _____
 - 10) other _____
- (name)

19) How big was the livestock holding, July 1, 1968?

- 1) cattle and calves _____
- 2) pigs _____
- 3) sheep _____
- 4) horses _____
- 5) hens and chickens _____
- 6) other poultry _____
- 7) other livestock _____

(name)

20) What single farm product provides most of your income from agriculture?

21) Where do you sell your farm products?

22) Has there been any change in farm practise during the last five years?

Yes _____

No _____

23) If yes, what change? _____

24) How much of your total income comes from agriculture?

%

- 1) less than 10% _____
- 2) 10% but less than 50% _____
- 3) 50% but less than 90% _____
- 4) more than 90% _____

Questions 25, 26, and 27 are for part-time farmers only.

25) For how many years have you been a part-time farmer on this farm? _____

26) How many days a week do you work outside the farm?

27) What is the approximate number of miles you commute per week? _____

28) If, for some reason, you had to move from this farm, where would you prefer to live?

- 1) In the city of Edmonton _____
- 2) In a small town not far from Edmonton _____
- 3) In another farming area near Edmonton _____
- 4) In another farming area far from Edmonton _____
- 5) No preference _____

29) Do you hire farm employees?

Yes _____

No _____

30) If yes, tell the categories and number of employees.

- | | <u>Number</u> | <u>Days per Year</u> |
|--------------------------|---------------|----------------------|
| 1) full-time, year round | _____ | _____ |
| 2) part-time, year round | _____ | _____ |
| 3) full-time, seasonal | _____ | _____ |
| 4) part-time, seasonal | _____ | _____ |

31) Is there electric power on your holding?

Yes _____

No _____

32) How is the need for water supplied?

- 1) By waterline from the City of Edmonton _____
- 2) By local service _____
- 3) By own well _____
- 4) Other _____

33) How is the need for sewage disposal arranged?

- 1) By sewer line from the City of Edmonton _____
- 2) By local service _____
- 3) By own septic tank _____
- 4) Other _____

34) Other information which might be of interest _____

APPENDIX II

DEGREE OF LAND USE DIVERSITY PER SUB-AREA (BASED
ON TABLE XV)

	Group* 1	Group 2	Group 3	Group 4
Rank 1	Strath E	Sturgeon	Strath E	Sturgeon
Rank 2	Stony Plain	Stony Plain	Stony Plain	Strath E
Rank 3	Strath S	Strath S	Strath S	Strath S
Rank 4	Sturgeon	Strath E	Sturgeon	Stony Plain

* See Page 92 Strath E - Strathcona East
 Strath S - Strathcona South

DEGREE OF LAND USE DIVERSITY IN SPECIAL CATEGORIES PER SUB-
AREA (BASED ON TABLE XVI)

	Group* 1	Group 2	Group 3	Group 4	Group 5
Rank 1	Sturgeon	Sturgeon	Strath E	Strath S	Stony Pl
Rank 2	Strath E	Strath E	Strath S	Stony Pl	Strath E
Rank 3	Strath S	Stony Pl	Stony Pl	Sturgeon	Strath S
Rank 4	Stony Pl	Strath S	Sturgeon	Strath E	Sturgeon

* See Page 94 Strath E - Strathcona East
 Strath S - Strathcona South
 Stony Pl - Stony Plain

APPENDIX III

CHANGES IN FARM PRACTICE DURING THE PAST FIVE YEARS IN THE
RURAL - URBAN FRINGE ZONE OF EDMONTON

Change:	From	To	Number
	grain	dairy	5
	grain	beef	2
	mixed	dairy	3
	mixed	beef	2
	mixed	hog	2
	mixed	horticulture	2
	mixed	stable	2
	dairy	poultry	2
	dairy	grain	1
	cattle	grain	1
Total			22

<u>Other Changes</u>	<u>Number</u>
Utilization of more efficient farm machinery	6
Greater use of fertilizers	11

APPENDIX IV

FARMING INTENSITY, SIZE OF FARM, AND DISTANCE BETWEEN INNER FRINGE ZONE BOUNDARY AND FARM FOR EACH INDIVIDUAL FARM IN THE RURAL - URBAN FRINGE ZONE OF EDMONTON (TOTAL NUMBER OF FARM HOLDINGS IS 66)

Type of Farm	Intensity	Size (acres)	Distance
Market Gardening	166.0	11	0.0
	14.0	15	1.5
Fur	52.0	5	1.0
Hog	33.0	20	2.5
	13.7	60	2.0
Poultry	20.0	65	1.5
	13.0	20	0.5
	6.5	125	1.0
Stable	5.4	65	2.0
	3.0	205	2.0
Sod	2.5	320	2.0
Dairy	7.0	40	1.5
	1.7	370	1.0
	1.6	500	1.0
	1.6	160	2.0
	1.3	410	2.5
	1.3	200	1.5
	1.1	490	0.5
Mixed	11.0	10	2.0
	7.0	20	2.0
	5.0	20	3.0

APPENDIX IV (Continued)

Type of Farm	Intensity	Size (acres)	Distance
Mixed (Continued)	3.6	30	1.0
	3.2	40	3.5
	2.2	110	2.0
	2.1	410	3.3
	2.0	50	2.5
	1.8	160	0.8
	1.7	160	1.0
	1.7	150	1.0
	1.5	100	2.5
	1.3	100	2.5
	1.3	100	3.0
	1.1	320	2.3
	0.9	150	1.5
	0.8	3,500	1.5
	0.8	160	3.5
	0.7	380	1.5
	0.6	500	0.5
	0.6	450	1.5
	0.6	440	1.5
	0.5	500	2.5
	0.4	660	2.5
	0.4	600	3.0
	0.3	910	2.0
Cattle	2.2	240	0.5
	1.7	150	1.5
	1.6	160	1.5
	1.3	430	2.5
	0.5	370	2.7

For Reference

NOT TO BE TAKEN FROM THIS ROOM

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